PAGE 6

Issue 32 March/April 1988 £1.20

The Magazine for all ATARI computers

WHIST
Type it in!



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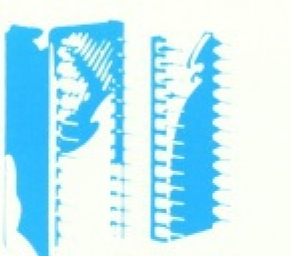
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PAGE 6 ATARI USERS MAGAZINE

Issue 32

March/April 1988

'The Magazine for the Dedicated Atari User'

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On sale 28th April. Copy date 21st March

PAGE 6 is published bi-monthly on the 1st of each alternate month.

PAGE 6 is a users' magazine which relies entirely on readers' support in submitting articles and programs. The aim is to explore ATARI computing through the exchange of information and knowledge. We will pay for articles and programs where appropriate and we hope that readers will enjoy seeing their work published. In turn we hope that other readers will learn from the articles and programs submitted and increase their enjoyment of Atari computing.

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PAGE 6 ATARI USERS MAGAZINE

Issue 32 March/April 1988

'The Magazine for the Dedicated Atari User'

ISSN No. 0952-4967

THE CREDITS

Full 'official' credits are on page 3, here are the people who made it possible.

Les Ellingham did the Editing

Nicola Parry looked after the ads

Phil Cardwell gave valuable Editorial Assistance

The **Regular Contributors** are ...

Garry Francis
Mark Hutchinson
Matthew Jones
John Davison
John Davison jr
John Sweeney
Paul Rixon

The Cover illustration and sundry other illustrations are by
Barry Armstrong

All other contributors for this issue are credited alongside their articles or programs. Thanks to everybody for contributing and thus helping others.

Very little inspiration for this issue! Those who did help include Chris Rea (especially Chisel Hill), Run Rig, Richie Havens, Eric Clapton (Yes!), Jan Hammer, Van Morrison (again!), Bruce Hornsby. The sunshine in the magical isles did not help at all!

Serious? You bet! But Atari is supposed to fun as well isn't it?

The next issue of PAGE 6 could feature YOUR article or program. So, send it!

PAGE 6 is put together almost entirely with Atari equipment and software. Hardware used: 130XE, 1050 disk drive, 810 disk drive, 850 Interface, modem, NEC 8023 printer, 1040ST, SM124 monitor, Atari SH204 hard disk drive, Epson RX100 printer, Microstuffer Buffer. Software used: Superscript, Turbo Basic, Tele-Talk, Kermit, Print Wiz and several custom written utilities on the 8-bit. STwriter, PC Intercomm, Thunder and Fleet Street Publisher on the ST.
Copy is prepared on a 130XE using Superscript and various custom written programs and then transferred to the ST via 8-bit Kermit and PC Intercomm. It is then spell checked with Thunder and the layout drafted with Fleet Street Publisher. Finished copy is output from the ST to a Konnect 2 cassette machine and then fed into a Monotype Lasercomp typesetter.

Editorial

130XE VERSUS ST

Most ST owners who have not previously owned an Atari will naturally think that their 16 bit computer is superior to the 8-bit Atari. Those who have 'upgraded' to an ST will also probably feel obliged to defend their decision and many existing 8-bit owners will feel under increasing pressure to sell up and buy an ST. But why? Is the ST really superior to the Atari XL or XE in all respects? Much depends on the software available and whilst in some areas the ST is certainly superior, in other, quite surprising, areas the good old 130XE is more than a match for the ST!

One of those areas is quite surprising – word processing! Now most people will think that word processing on the ST must be infinitely superior but it just ain't the case! This issue of PAGE 6 is the first where the word processing has been done entirely on the ST and it may well be the last! The reason for going over to the ST was the advent of Word Perfect, hailed as the ultimate word processor, which can certainly do some amazing things but which,in its current version , has a number of bugs and deficiencies and, unbelievably, can't do the one thing I need which is to save pure ASCII text! The two features I need from a word processor are keyboard macros and the ability to save ASCII text with no added carriage returns, line feeds or control codes. I want exactly what I type to be saved on the disk but, despite the claims, there does not appear to be one word processor on the ST which can do this and which also supports keyboard macros. On the 130XE I know of *three* word processors which can achieve this and which also contain 95% (or more) of the features that any average user will require. These programs are Superscript, Paperclip and, the biggest bargain of all, TextPro which is available in the public domain. Is it not truly amazing that an Atari 8-bit public domain program can out-perform many commercial programs on one of the world's most powerful home computers?

A CONTINUING PROBLEM

This lack of software support really highlights one of the main problems with the ST and a problem which has plagued Atari all along. Despite the wealth of software released, much of it is not up to the standard available on other machines and the ST is just not supported in the way it should be. A stroll round the recent Which Computer Show proved the point. There was hardly an ST to be seen anywhere. You could find one here and there brought in by those companies who have supported Atari for some time such as Mirrorsoft and HB Marketing but most visitors, unless they were looking hard, would have gone away completely unaware that an Atari ST can be used for serious applications. Even companies like Word Perfect Corporation and Cashlink Software, who both produce top business software for the ST didn't have an ST on their stands!

AND THE WINNER IS ...

Back to the ST versus the XE. For my money the 130XE is the outright winner as far as word processing goes. All the features that I need in a word processor are available on the 130XE and those extras that are on the ST I don't really need. Add to that the ease of programming the 130XE and in using DOS 2.5 (there are times when GEM can be more of a hindrance than a help) and there is no contest. The 130XE is friendlier, easier to use and, in this area at least, just as capable as the ST. Controversial comments? Yes, but these are the facts. If any ST users can come up with a compelling argument the other way I would be pleased to hear it. Better still, maybe someone could come up with some software that is as good as Superscript or TextPro!

When you think about it, the reason why the Amstrad is so successful, is that it does exactly what people need and no more. It is certainly not as powerful a computer as the ST but it does its job and so does the 130XE. If you are thinking of dumping that XL or XE, think again! Unless there is something you really need that you *know* the ST can do and your 130XE can't, don't bother buying an ST. Just stick with one of the best home computers ever produced. You probably don't realise just how good it is!

How to Type in the Listings

and get them right!

The program listings in PAGE 6 are prepared carefully to ensure that they can be typed in as easily as possible. Before typing any listings ensure that you are familiar with the use of the Shift and CONTROL and INVERSE keys as outlined in your computer manual. The listings are prepared to match exactly what you see on screen. Every character that you may see in a listing is included in the chart below for cross reference. By using TYPO 3 you can ensure that you type in the programs EXACTLY as they are printed. Remember a single typing mistake may mean a program will not run.

WHAT ARE THOSE CODES?

Each line of a program begins with a special two letter code. THESE SHOULD NOT BE TYPED IN. They are used by the program TYPO to check that you have typed each line correctly. IF YOU HAVE NOT ALREADY TYPED IN THE TYPO 3 LISTING PLEASE DO SO NOW. The program can be used as you type in each line of a program or to check an already typed program. The code for each line will match but if you have problems check the listing conventions below carefully, you are most probably typing a CONTROL character incorrectly. TYPO 3 cannot check if a line has been missed so if you have problems in running a listing count the lines in the program and ensure none are missing. If the TYPO codes match and the program still does not run, LIST it to cassette or disk using LIST "C:" or LIST "D:filename", switch off the computer, re-boot and then ENTER the program using ENTER "C:" or ENTER "D:filename". Save this version in the normal way.

HOW TO USE TYPO 3

1. Type in the listing carefully for although you can use TYPO 3 to check itself (see 6 below) it may not work if you have made mistakes.

2. SAVE or CSAVE a copy of the program.

3. Each time you want to type in a program listing RUN TYPO 3 *first*. The program will install a machine code routine in memory and then delete itself. Now type in a line as shown in the magazine *excluding the first two letter code* and press RETURN.

4. A two letter code will appear at the top left of your screen. If this code matches the one in the magazine carry on and type the next line. Note, the code will not match if you use abbreviations. If you prefer to use abbreviations LIST the line you have just typed, move the cursor to that line and press RETURN. The code should now match.

5. If the code does not match, use the editing keys to correct the line and press RETURN again. Repeat if necessary until the codes match.

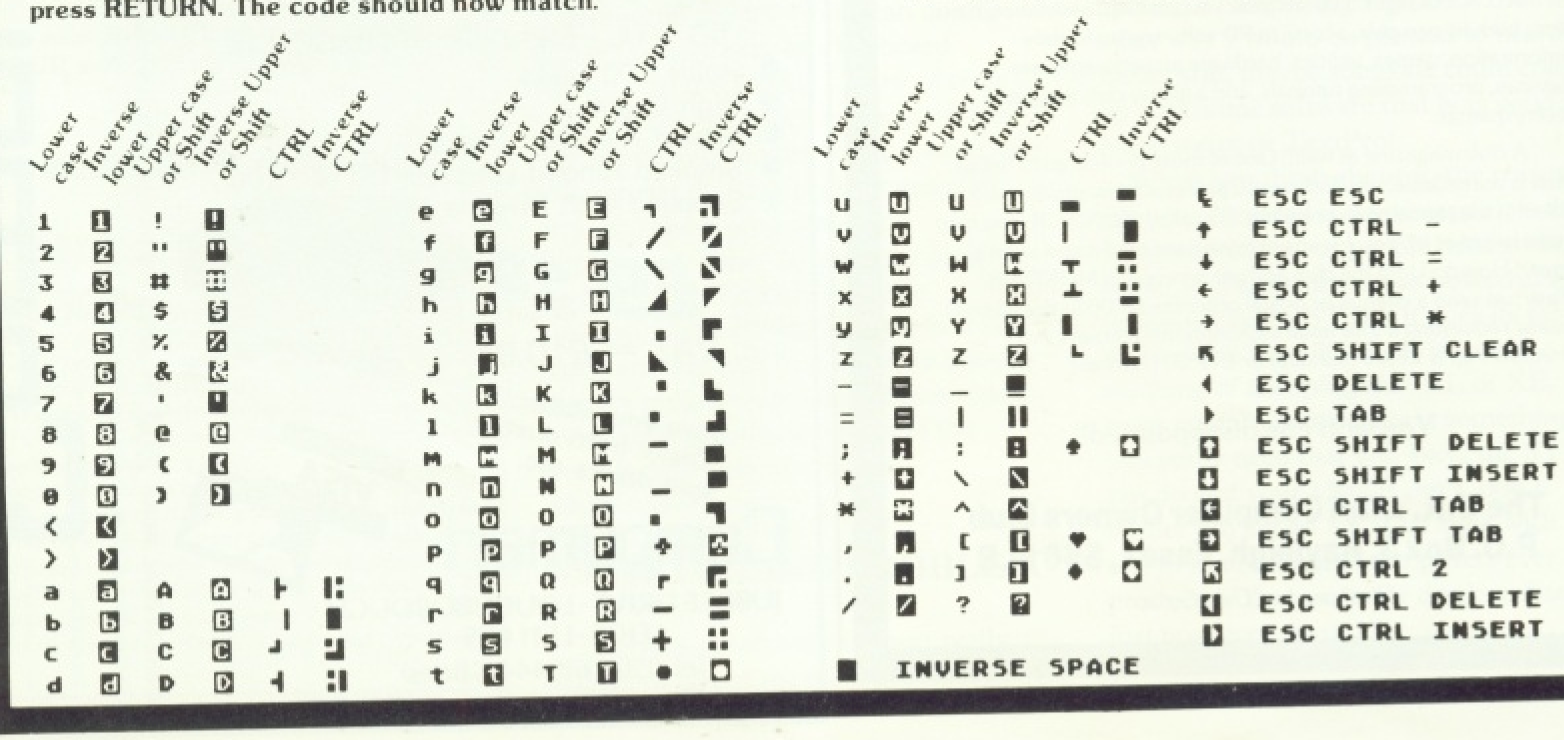
6. To check a line you have already typed LIST the line, place the cursor on that line and press RETURN.

7. When you have finished a listing just SAVE or CSAVE it in the normal way.
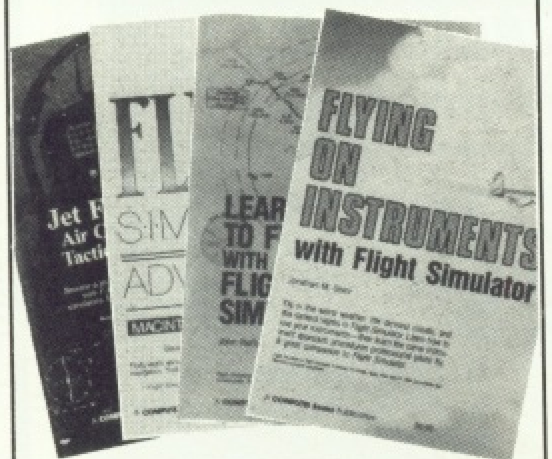
You can type in a program without using TYPO 3 and then check it by SAVEing or CSAVEing a copy of the program, running TYPO 3 and then LOADing or CLOADing your program and proceeding as in step 6 above.

Always SAVE or CSAVE a program before running it and always use TYPO before telling us that a program will not run.

```
EI 1 REM ********************************
AL 2 REM *  TYPO III by Alec Benson     *
         *           June 1985          *
SA 3 REM * A proofreader for ANTIC and *
         *    PAGE 6 based on TYPO II   *
         * published by ANTIC magazine *
EL 4 REM ********************************
SG 100 GRAPHICS 0
WG 110 FOR I=1536 TO 1791:READ A:CK=CK+A:
   POKE I,A:NEXT I
CG 120 IF CK<>30765 THEN ? "Error in DATA
    statements - Check Typing":END
YM 130 A=USR(1536)
VT 140 ? :? "TYPO III is up and running":
   NEW
MA 1000 DATA 104,160,0,185,26,3,201,69
HG 1010 DATA 240,8,200,200,200,192,36,208
OB 1020 DATA 242,96,200,169,79,153,26,3
RK 1030 DATA 200,169,6,153,26,3,162,0
RR 1040 DATA 189,0,228,157,79,6,232,224
TO 1050 DATA 15,208,245,169,93,141,83,6
KC 1060 DATA 169,6,141,84,6,173,4,228
EU 1070 DATA 105,0,141,95,6,173,5,228
BK 1080 DATA 105,0,141,96,6,169,0,162
KK 1090 DATA 3,149,203,202,16,251,96,0
ZR 1100 DATA 0,0,0,0,0,0,0,0
LD 1110 DATA 0,0,0,0,0,0,32,94
JM 1120 DATA 6,8,72,201,155,240,55,230
TV 1130 DATA 203,133,209,138,72,169,0,133
TW 1140 DATA 208,162,8,10,38,208,6,209
MF 1150 DATA 144,7,24,101,203,144,2,230
RL 1160 DATA 208,202,208,239,133,207,24,1
    65
TM 1170 DATA 204,101,207,133,204,165,205,
    101
AW 1180 DATA 208,133,205,165,206,105,0,13
    3
XH 1190 DATA 206,104,170,104,40,96,138,72
NR 1200 DATA 152,72,162,0,134,207,134,208
GF 1210 DATA 160,24,6,204,38,205,38,206
EA 1220 DATA 38,207,38,208,56,165,207,233
TM 1230 DATA 164,170,165,208,233,2,144,4
SK 1240 DATA 134,207,133,208,136,208,227,
    162
CB 1250 DATA 8,165,207,133,204,165,208,6
XN 1260 DATA 204,42,201,26,144,4,233,26
MB 1270 DATA 230,204,202,208,242,133,205,
    169
BC 1280 DATA 128,145,88,200,192,40,208,24
    9
WV 1290 DATA 165,204,105,160,160,3,145,88
OA 1300 DATA 165,205,24,105,161,200,145,8
    8
MO 1310 DATA 32,69,6,104,168,76,153,6
```



MORE FLIGHT SIMULATOR BOOKS



At last! Compute!'s latest Flight Simulator titles have arrived in the UK. Learning To Fly with Flight Simulator is for those who have just bought their copy of FS2, whilst experienced pilots will enjoy Flying On Instruments. Those who would just like more fun can read Flight Simulator Adventures for the ST.

On a different tack Jet Fighter School is a unique book looking at aspects of combat flying with programs like F-15 Strike Eagle. Check them out now!

WATCH OUT FOR ZEPPELINS

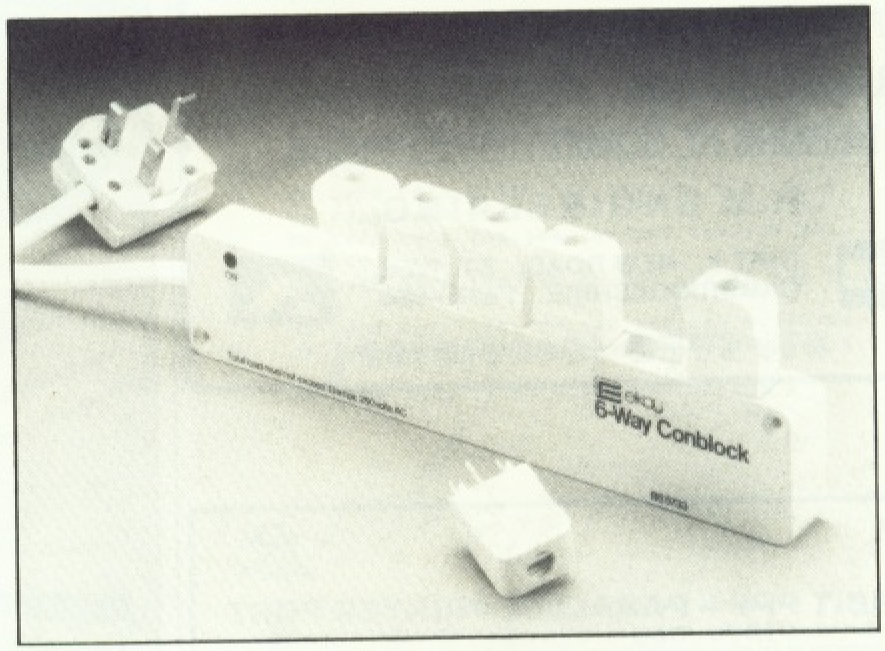


More good news for Atari 8-bit owners is the formation of a new games company up in Newcastle-upon-Tyne called Zeppelin Games. The company has as one of its directors, Brian Jobling, an established and well respected Atari programmer and the company fully expect to support the Atari 8-bit as much as possible.

Managing Director is Derek Brewster, a former journalist with CRASH magazine and an experienced Spectrum and Amstrad programmer. The company will have a full in-house team of programmers and intend to put out quality programs on cassette at just £2.99. Obviously they intend to produce games over the whole range of 8-bit computers but one of the company's first releases is for the Atari. Look out for Speed Ace which is an excellent motorcycle race game played either against nineteen computer controlled riders or as a two player game on some of the world's most famous racing circuits.

The preview copy of Speed Ace received by PAGE 6 looks well worth the £2.99 price and we hope to see more Atari titles from Zeppelin as they become established. It is a brave step nowadays to make an Atari version one of your first releases and we hope that you support Zeppelin so that they in turn can let us have more and more Atari titles.

KEEP IT ALL TIDY



Have you ever looked at the mess underneath your computer desk? Most likely you have fallen over all those wires many times and have run out of sockets around the house! Help is at hand from Cambrian Distributors, a new marketing arm of Elkay Electrical Ltd. a leading British manufacturer of electrical connectors. Of interest to computer owners are the Multiplug range of power connectors and a TV aerial switch that allows three different inputs to one TV.

The standard Multiplug range includes units which allow two, four or six appliances to be connected to one 13 amp socket and is ideal for your Atari and all the peripherals attached to it. The units are available either fused or non fused and prices start at £10.99.

If you use your computer heavily for business or serious work, or are worried about losing some long programs under development due to fluctuations in the mains, a Smoothflow Multiplug might be the answer. This gives four filtered outlets from a single 13 amp socket and protects equipment against mains spikes and surges as well as eliminating mains interference on the sound channels of Hi-Fi and Video units. Prices for this range start at £21.99.

Perhaps of more interest to the majority of Atari owners who have to share a TV for their computer is the 3-2-1 aerial switch. For just £4.99 you can connect up to three input devices to your TV and choose between them at the flick of a switch. You can therefore connect up your Atari, TV Aerial and Video and need never again fumble about behind the TV to change the connections. You could also, if you wished reverse the unit and demonstrate your favourite computer game on up to three TV's!

Further details of these products can be obtained from Cambrian Distributors, Newtown, Powys SY16 4LF who also sell by mail order. The telephone number is 0686 24508.

Readers Write

HEAVENS ABOVE!

Dear Sir,

I read the letter in the Readers Write, issue 31, relating to a user complaining about not enough astronomy programs for Atari computers. There are a few programs available including:

Astronomy 1 from Computer Direct, 22292 N. Pepper Road, Barrington, IL 60010, U.S.A. for the price of $5.95 plus postage.

Atari Planetarium (really great!) from Computer Palace, 3478 Hiway 101 N.E., Lincoln City, OR 97367 for the price of $36.90 plus postage. This one has a 115 page instruction book. The program charts out 1200 stars, 88 constellations, Solar System, Halley's Comet and more than 300 Deep Sky objects. Highly recommended.

Computer Astronomy Network, 20 Helen St., Warren, NJ 07060, U.S.A. is a club for people interested in astronomy on computers. There is a newsletter which relates to various computers. Write for more information to Barry Malpas at the above address. I am a member of this group.

I hope that Miss Lancaster will benefit from this information and will be able to find a use for her Atari in astronomy.

Bob Lussier
Burnaby, B.C.
Canada

Many thanks for the information. Atari Planetarium is also available from Software Express in Birmingham and we have also heard from a company called Sirius Optics (0703 872649) who inform us that a series of programs are planned for the ST and are due for release towards the end of March.

Write to:

PAGE 6,
P.O. Box 54,
STAFFORD
ST16 1DR

DOS DILEMMA

Dear PAGE 6,

I have recently bought a copy of 'Turbo-Basic' which is DOS 2.5 compatible and I would recommend that all Basic programmers should consider purchasing this software.

My problem is that all my Basic programs are in DOS 3 format and I would rather convert them with some other method than using the cassette recorder. DOS 3 has a utility for converting DOS 2 files, is there a utility available for converting DOS 3 files to DOS 2.5? Any information you give me would be gratefully accepted.

A.P. Gosney
Rainham, Kent.

The full version of DOS 2.5 has a utility called COPY32.COM which will do exactly what you want. A copy is available from the PAGE 6 Accessory Shop on library Disk #36 – The XL/XE Kit for £3.95 and the disk contains several other useful utilities. We also published a program called ACCESS III back in Issue 14 but unfortunately this is now out of print.

3-D ANIMATOR PROBLEMS

Dear PAGE 6,

Is there an error in the 3-D Animator listing in issue 30, November 1987? I have typed it in using 'TYPO III' and saved it with filenames as stated, everything works until I select 3 from the menu to animate the drawing. It starts to load the program then crashes with 'error 147 at line 5060'.

I am running the program on a 130XE and I have followed the instructions to the letter.

Paul Thomas
Rednal, Birmingham

If you look at page 62 of issue

IF YOU CAN'T AFFORD IT, STEAL IT

Dear Sir/Madam(?),

We are confessed software pirates – not actually selling software but illegally copying it for our own use. The question we ask is this – how can beginners build up a software library, legally, at £10 for a decent game and £20+ for utilities/business software?

This was exactly our situation six years ago. We now have a library of over 400 games all obtained illegally. If we had gone by the book it would have cost us approximately £4000 (accounting for budget games and business programs).

It would not surprise us if this letter did not appear in your magazine (we still think your magazine is the best to date).

The Vienna Pirates

The old controversy raises its head once more. You should know our views by now and unfortunately there is not enough space to repeat all the arguments. What I don't understand is why anyone actually needs 400 games, you can't play that many surely?. You are not 'collectors' in the genuine sense of the word, how many people collect photocopies of stamps? You obviously don't care about small companies going out of business or about the long term support of Atari by the software houses. Why not just read the reviews, try and get a look at games in the shops and buy what you can afford? If you can't afford that many games then you just have to accept it. Or do you steal other things you can't afford as well?

TREE TRACING ENIGMA

Dear PAGE 6,

As an ardent Genealogist, I have just read, with great interest, the article in issue 30 by William A. Benbow. Unfortunately, as a beginner with the Atari I have one or two questions which I hope you can answer. I use an 800XL, a 1050 Disk Drive and a 1029 printer and my questions are as follows. Can the program 'Family History' be used on my computer? Is it available in the U.K. or must I apply to California for it?

I find your magazine very interesting, issue 30 being the second one I have read – hence the enclosed subscription. Keep up the good work.

Ron Bidwell
Littleport, Cambs.

There shouldn't be any problems in using Family History on your system although, if the program uses graphics dumps it will not support the 1029. Printed output is likely, however, to be straight text so you should have no problem. The program is not, to our knowledge, available in this country so you will need to order direct from Direct Lines Software. The easiest way is to obtain an International Money Order from any branch of Barclays Bank for the price of $39.95 plus $10 or so for postage. You are unlikely to have any problems as Direct Lines Software is a small company run by an enthusiast but it might be wise to write first with a couple of International Reply Coupons to check the current price and postage. Most small companies in the States are quite helpful and are quite happy to ship overseas but make sure that they ship Air Mail or you will be in for a long wait!

30, under the heading 'Two Simple Rules For Animation', and read rule two carefully, you may discover that you have not followed the instructions to the letter. You have probably designed an animated sequence that is more than 22,000 characters in length which thus breaks memory limitations and then throws your error 147 because the computer does not have enough memory to set up a GRAPHICS 8 screen.

RAW DEAL FOR NEW OWNERS

Dear Sir,

Is anyone out there as confused as I am at the current bundling of a cassette recorder with the 130XE and 65XE? I, and many other readers I should think, bought my 800XL, complete with disk drive for £120 two years ago and have been very pleased with it. I added a 1029 printer, for £105, and can do good graphics dumps and list programs (I even send letters to understanding friends on it). A nice little system for £225.

But what about new owners? How will they upgrade to a disk drive at this stage of the game? 1050's are disappearing, to be replaced (promises, promises) by a double sided drive at £180, or so the rumours go, but surely that's much too expensive for a disk drive by current standards. If we wanted proof that it's the end of the line for our 8-bits, then this must be it!

Also could anyone out there make a little box for about £50-100 which will allow us to connect the new cheap megabyte drives to our machines? Without them we'll be forced into using ST's or Amigas.

I think I'll phone the Samaritans!

Richard Martin
Acton, London

MONITOR MAYHEM

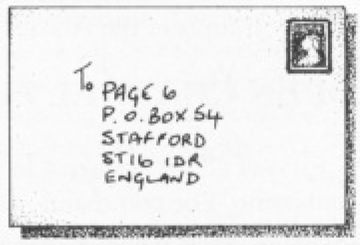
Dear Sir,

I am considering purchasing an Atari ST for business/home use, but I am rather confused about which monitor to buy, if any. I could use my portable colour television to begin with. What will the quality of the graphics and text that are produced be like, and how good will this be in comparison to the Atari medium resolution monitor colour monitor?

On the other hand, I could just about afford to buy a high resolution monochrome monitor. Will the text and graphics be significantly better? As I have access to a printer, I intend to do some word-processing/spreadsheet work and do not want my eyes to suffer as they have done whilst using an Amstrad PC1512 in work.

I.J. Ackery
Downend, Bristol

If you want to do word processing on the ST you are unlikely to be satisfied with a TV which will not give sufficient definition in Medium-Res used by most word processors. An Atari mono monitor gives a sharper, clearer screen than almost all of its competitors due to its 70Hz refresh rate. If you do serious word processing or use spread sheets, I would not hesitate to recommend an Atari mono monitor. If you need colour then a monitor must be considered essential for this type of work. Atari's own colour monitor or a Philips 8833 would be ideal. I can assure you, either way, the ST display will knock spots off the Amstrad!



ARE REVIEWERS PERFECT?

Dear PAGE 6,

I have been a subscriber to your magazine for approximately two and a half years and have found it to be informative and entertaining – especially the reviews. However, it is with one of the reviews that I must take exception.

Following an extremely favourable review of Mini-Office II, both by yourselves and an Atari-dedicated competitor, I acquired the software. I was particularly impressed by the claims made for "a very flexible mail-merge facility" and "an incredibly well integrated program". Unfortunately, as these were the only aspects of the software that I needed, I have not found these claims to be substantiated. The mail-merge program contains a serious bug, already admitted by Database Software, that almost renders it useless. I refer to a spurious character that is printed in the 21st space of every field in the database, provided that the 20th space is filled by a character other than a blank, when used with either mail-merge or the label printing facility.

Furthermore, whilst the mail-merge facility allows database fields to be butted together, the label facility automatically interposes two spaces between fields. So much for integration!

I should be interested to know the extent of testing that is undertaken by reviewers of non-game software prior to eulogising the product. Having received a second copy of the program direct from Database Software, it took me less than half an hour to establish that it produced the same error and to run a full check on every space in all the fields of the database to determine the frequency of the error. Unfortunately, it took a number of hours to work my way around to an acceptable solution to these and other problems relating to printer paging that I will not go into now.

Despite the foregoing criticisms of the program and the reviewer, I have no hesitation in recommending the word-processing component as simple to use and functional.

Nicholas J. Reece
London E18

As you will no doubt appreciate, reviewing software is a very difficult task, especially if the programs main functions are designed for commercial use. Sometimes the reviewer may have had the software for only two or three days and he/she cannot be expected to find every bug in the program(s). Wherever it is practical, extensive testing is carried out on all pieces of software, but time is limited and the reviewer must estimate how long it will take to assess the software and how long it will take to do the write up. These issues aside, the reader must also bear in mind, that a review is not only a test of the software's performance but it is also one man's opinion. There is also the matter that if the producer of a software package cannot find a bug in what is normally extensive pre-release testing how can a reviewer be expected to find all the bugs? In the particular case of Mini Office II the reviewer had purchased the software himself and was obviously quite happy with it. He had not discovered the bug you mention, and might never do so. His opinion will probably remain the same because the program does everything he needs.

THE QUESTION MARK AFFAIR

Allan Palmer investigates and solves a mystery

In the Letters page of issue 30 of PAGE 6, a method of getting rid of the question mark prompt when using the INPUT statement in Atari BASIC was given. The example was:

```
10 DIM A$(10)
20 ? "ENTER SOMETHING ";:INPUT #16,A$
30 ? A$
```

Although this solution works, the Editor stated "don't ask me why!". Well, I believe that I have traced down the cause of this undocumented feature (or is it a bug?) in good old Atari BASIC. So, if you bear with me, I will explain the some of the inner workings of the Atari.

OPEN CHANNEL ZERO

First of all, let us take a look at the format of the INPUT statement. The command may appear as, e.g. INPUT NAME$, or INPUT #2,RECORD$. The #2 (or #16) is a channel number identifying the device from which the input is to be taken. Where the channel number is absent, #0 is assumed which is the screen editor. The channel number points to one of the Atari's eight Input/Output Control Blocks (IOCBs). At this point, you may say if there are only eight channels or IOCBs, which channel does an INPUT #16 statement use? From the fact that the example quoted at the top of this article works, it appears that channel 16 is treated as channel 0.

A BASIC ERROR?

At this point I thought that all that was happening was that any channel number greater than 7 (the eight IOCBs are numbered 0 to 7) was being treated as 0. I then tried the example with INPUT #10 in place of INPUT #16. The result was Error 20, which when looked up in the back of Your Atari Computer is explained as "Bad Channel Number – The program tried to use channel 0 or a channel number larger than 7". Confusion reigned – 10 is larger than 7 and fails, but 16 works! Some further experimentation showed that channel number 32 works, but using channel 17, error 131 appears ("A GET or INPUT statement used a channel opened for output only").

AN INSIGHT TO THE PROBLEM

At this point, I started looking through my collection of Atari-related books and magazine articles. The obvious place to find the key to this obscure mystery seemed to be one of Bill Wilkinson's 'Insight: Atari' articles in COMPUTE! magazine. After some delving I found the clue I needed in Bill's articles in the November 1981 and January 1985 issues. Both columns describe the use of IOCBs, particularly as used from assembly language. Bill explained that when undertaking input/output in assembly language via CIO, the program should specify which channel to use by passing the relevant IOCB number *times 16* in the X-register. Each IOCB is 16 bytes long, so the X-register value is used as an offset to the start of the whole IOCB area.

HOW MUCH CAN YOU PUT IN A BYTE?

Things began to fall in place now. When an INPUT command specifies channel n, the Atari operating system is actually using 16 times n. So, channel 0 is 0, but channel 1 is 16, channel 2 is 32 ... channel 10 is 160 ... channel 16 is 256, channel 17 is 272, etc. However, an eight-bit computer like the Atari stores values in bytes of memory where each byte consists of eight bits – the maximum value in one byte is 255, thus any value greater than 255 must occupy two bytes. I now turned to COMPUTE! Books' Atari BASIC Source Book compiled by Bill Wilkinson (who else?) and began to peruse the listing of the original source code for Atari BASIC included in that publication.

MULTIPLICATION IS THE NAME OF THE GAME

After studying the source code for a while I managed to identify what was happening. There are in fact two areas to consider. Firstly, when processing an INPUT command, BASIC only prints a '?' prompt if the channel number supplied is 0 (zero). Thus for channels 1 to 7 (corresponding to the remaining IOCBs), no '?' is printed when an INPUT command is processed. Secondly, the input channel number is multiplied by 16 to be passed to the CIO system to specify the relevant IOCB. Logically, the channel number is not expected to be greater than 7. Unfortunately, BASIC uses a one-byte field to pass the channel number times 16 to the CIO system to initiate an INPUT command. However, this field is validated to see if it is not greater than 7 times 16 by checking if the field is negative by using a BMI instruction. In an eight-bit byte, the setting of the most significant (left-most) bit indicates a negative value. Take a look at the binary equivalents in Table 1.

In the right hand portion of the Binary equivalent column, values equivalent to channels 8 to 15 inclusive have their negative bit set and result in an Error 20 from BASIC. Channel 16 results in a binary equivalent setting the least significant bit in the left hand portion only, the right hand portion remains equivalent to zero. Consequently, BASIC can be fooled if a channel number which is a multiple of 16 is supplied in the INPUT statement because the byte being tested remains zero.

Channel	Channel × 16	Binary equivalent	
0	0	00000000	00000000
1	16	00000000	00010000
2	32	00000000	00100000
3	48	00000000	00110000
4	64	00000000	01000000
5	80	00000000	01010000
6	96	00000000	01100000
7	112	00000000	01110000
8	128	00000000	10000000
...	...	...	...
15	240	00000000	11110000
16	256	00000001	00000000
17	272	00000001	00010000
...	...	...	...
32	512	00000010	00000000

THE QUESTION ANSWERED

Referring back to the original example then, because the channel number specified in the INPUT command is a multiple of 16, it is acceptable as a valid parameter because it in turn is multiplied by 16 and the least significant byte remains at zero indicating channel 0 (the screen editor). However, because the value in the channel actually specified in the INPUT command is not zero, the '?' prompt does not appear.

Hopefully, this convoluted investigation will explain why there is a way to get rid of the '?' prompt when using the INPUT command and the screen editor.

My thanks must go to Bill Wilkinson for all the bits of information and insight (no pun intended) that he has provided to Atari enthusiasts over the years. Without the background data that he has published I am sure our understanding of the Atari would not be as great as it today. •

DISK BONUS

MASTER OF THE MINDFIRE

by Duncan Stuart

A 100% machine code arcade game available only as a Bonus on this issue's disk

This issue we are proud to present, as a bonus on Side 2 of the Issue 32 disk, a superb machine code arcade game originally written for commercial release by Duncan Stuart, author of Red Rat's recent blockbuster Nightmares. It is a challenging and difficult game that will test your skills to the limit. We haven't managed to get past level 3 without cheating! Can you do better?

THE GAME

The game is a 1 player arcade game played with a joystick in port 1. You control a doughty young wizard sent to a country mansion to expel the evil forces gathering there. You have been chosen from your sect of grey wizards to combat the evil since you alone control the 'Mindfire' – a living creature of magical powers. You can use it to effect by shooting small bolts of the fire from your staff. The Mindfire also endows you with a number of spells you can use to your advantage in the different levels of the game.

In the first level you must find the key to escape each room while being harassed by ghosts. It could be on the ground floor or on the gallery which you can reach by pushing the joystick up to activate the levitation spell. When you have found a key exit the room bottom left.

In the second level you can shoot the suits of armour but must avoid the spears by pulling down on the joystick to use the shrinking spell. You will stay shrunken for only a few seconds or until you press the joystick button.

In level three you have passed through the mansion to an underground cavern. You can cross the crevasse by touching a stalactite and pressing the joystick button to use the sky-hook spell. To get upwards you must climb the stalagmites.

Next you will shape change into a bird in order to sort out the pterodactyls that have made the caves of level four into their home. You must shoot them in the body and not the wings to cause them to fall and smash a hole through the bottom of the cave. When you have made a large enough hole, you can go down through it and take on the lava monster to discover the exit to the cave.

Finally you must continually shoot the flying creature in level five to complete the game, after which you will return to level one to discover if you are strong enough to try again!

When you have lost a life or finished a level you must press the joystick button to continue. The START button will begin the game from the title screen and can thereafter be used to pause the game.

Master of The Mindfire is a great game which Disk Subscribers will receive automatically as a Bonus with this issue. Other readers may obtain a copy of the Issue 32 disk, which also includes all of the programs from this issue ready to run, for £3.95 (£3.50 if a subscriber) from PAGE 6, P.O. BOX 54, STAFFORD, ST16 1DR

GRAPH MAKER

Jason Peasgood presents a utility for pie charts, bar graphs and line graphs for simple home use. The program is suitable for the 1029 printer but we have added a routine for Epson compatibles

Many Atari owners use their computers for some sort of business or record keeping so here is a simple utility to give all those dry figures a bit of sparkle. Graph Maker is not a super sophisticated program like the commercial B/Graph but it will produce neat graphs of various figures, percentages etc. which can be dumped out on a 1029, Epson or fully Epson compatible printer.

The program gives you a choice of either a Pie Chart, usually chosen for showing percentages of a base number, a Bar Chart for showing comparative values of different objects or a Line Graph, used for showing different values over a period of time.

The main listing for Graph Maker will print out graphs on a 1029 printer, but owners of Epson or Epson compatible printers can omit lines 30000 to 30150 from Listing 1 and use Listing 2 instead. Just leave Listing 1 in memory and carry on typing Listing 2. Listing 2 can also be used as a stand alone routine for a Graphics 8 screen dump on an Epson or compatible printer.

PREPARING YOUR GRAPHS

The program has many easy to understand prompts throughout but details of each type of graph are given here for reference.

PIE CHART: This option allows you to show percentages of any number neatly in an accurately segmented circle. After the initial circle has been drawn you will be asked to input the base number. This is the total that the segments of the pie chart will be percentages of. You will then be asked for the number of fields you require which is the number of segments that the total will be divided into, so if you wanted 5 segments you would type 5.

The name and size of each field is then requested. The size should not be input as a percentage, but as the actual number it represents. Each segment is then calculated and drawn, and the name is printed next to it. After all the segments have been named and drawn you are asked for the title of the chart. You will finally be given the option of either dumping the screen to a printer, or creating another graph.

BAR CHART: You can use this option to create graphs with up to 36 bars across (the x-axis), and a wide range of scales are available on the y-axis.

After choosing the number of bars you want you are asked for the smallest number you want on the y-axis, which can be any number from 0-49. Next you are asked for the maximum, which can be any number from 1-50, as long as it is larger than the minimum number, but the difference between the two cannot be more than 18. The numbers on the y-axis are then plotted, with the scale calculated automatically thus using as much of the screen as possible.

The height of each bar is then requested. You must calculate the figures according to the scale selected and you can only enter whole numbers up to the maximum chosen. After the bar chart is drawn you are asked if you want to create another graph or print the current one. If you choose to print it you will be asked for individual names for each bar, and labels for both axes.

LINE GRAPH: This can be used to create a line graph, similar to the sort you see on a manager's office wall referring to sales over an amount of time, but the figures could represent anything such as the increase in a baby's weight over a given period of time for example.

You will first be asked for the number of points you want plotted, up to a maximum of 36. You are then asked for the y-axis scale and the value of the points on the x-axis, with the same rules applying as for the bar chart. The points are then plotted, according to the numbers that were entered, and joined up. When this is complete you are again asked if you want to dump this graph to a printer, or create another graph. If you choose to print it you will be asked for axis labels but you have a choice whether you want individual labels for each point or if the x-axis label is the general name. For example the x-axis could be called 'November' or each point on the x-axis could be a separate day/date.

ROUTINES INCLUDED

General routines included in the program are a short program for printing text quickly onto a Graphics 8 screen and a routine for drawing an accurate circle. The printer dump routine is a Graphics 8 screen dump for the 1029 and starts at line 30000. Remember, if you have an Epson printer, use Listing 2 instead.

FINALLY ...

This program may not be as sophisticated as commercial products like Mini Office II or B/Graph, but it is a cheap and effective way to produce simple graphs and charts which should cope well for small every day needs like who pays what percentage of the telephone bill!

```
QJ 0 REM ******************************
KA 1 REM *        Graph Maker          *
TB 2 REM *            by               *
HL 3 REM *       Jason Peasgood        *
IY 4 REM * -------------------------- *
RJ 5 REM * PAGE 6 MAGAZINE - ENGLAND *
QP 6 REM ******************************
YE 10 DIM F$(110),B$(10),A$(1),T$(41)
NJ 15 T$="
        "
BQ 20 POKE 559,0:TRAP 15
ZX 30 GRAPHICS 0:SETCOLOR 2,0,0:SETCOLOR
   1,0,0:POKE 752,1
BQ 40 POSITION 0,0:? "┌┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┐"
RZ 50 FOR R=1 TO 21 STEP 2:POSITION 0,R:?
   "| | | | | | | | | | | | | | | | | |
   | |";:NEXT R
XB 60 FOR R=2 TO 22 STEP 2:POSITION 0,R:?
   "├┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┤";:NEXT R
GY 70 POSITION 0,22:? "└┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┴┘";
FY 80 POSITION 9,3:? "G|R|A|P|H|-|M|A|K|E
   |R|"
TT 90 POSITION 7,7:? "1| |P|I|E| |C|H|A|R
   |T|"
KK 100 POSITION 7,9:? "2| |B|A|R| |C|H|A|
   R|T|"
BX 110 POSITION 7,11:? "3| |L|I|N|E| |G|R
   |A|P|H|"
ZC 120 FOR R=0 TO 37
SW 130 FOR T=1 TO RND(0)*11
UM 140 POSITION R,23-T:? "█";:NEXT T
JN 150 NEXT R
RF 160 POKE 559,34
KW 170 FOR R=0 TO 15:SETCOLOR 1,0,R:NEXT
   R
XL 180 CLOSE #1:OPEN #1,4,0,"K:"
GA 190 GET #1,A:FOR R=15 TO 0 STEP -1:SOU
   ND 0,100,10,R:SOUND 1,100,6,R:NEXT R:I
   F A<49 OR A>51 THEN 190
RJ 200 ON A-48 GOTO 1000,2000,3000
PE 210 GOTO 190
PW 999 REM  PIE CHART
PR 1000 FOR R=15 TO 0 STEP -1:SETCOLOR 1,
   0,R:NEXT R:TRAP 1000
VJ 1010 GRAPHICS 8:SETCOLOR 2,0,0:SETCOLO
   R 1,0,15
YB 1020 COLOR 1
YI 1030 X=160:Y=80:R=76:GOSUB 1700
MI 1040 PLOT X,Y:DRAWTO X,Y+R
UK 1050 ? "▸Enter Base Number --";:INPUT
   BASE
NZ 1060 IF BASE<=0 THEN 1050
WP 1070 ? "▸Enter number of fields --";:I
   NPUT FIELD
VW 1080 IF FIELD<2 OR INT(FIELD)<>FIELD T
   HEN 1070
FY 1090 COUNT=BASE:DEG :P1=0
XG 1100 FOR T=1 TO FIELD-1
EJ 1110 ? "▸Enter NAME of field ";T;" --"
   ;:INPUT B$
HD 1120 ? "▸Enter SIZE of field ";T;" --"
   ;:INPUT SIZE
KQ 1130 IF SIZE>COUNT OR SIZE<0 THEN 1120
BH 1140 COUNT=COUNT-SIZE
KV 1150 P=(360*SIZE)/BASE
VN 1160 P1=P1+P
YF 1170 PLOT X,Y
XR 1180 DRAWTO X+SIN(P1)*R,Y+COS(P1)*R
TX 1190 P2=P1-(P/2)
GH 1200 PLOT X+SIN(P2)*R,Y+COS(P2)*R
RY 1210 IF P2<=180 THEN DRAWTO 319,Y+COS(
   P2)*R:X1=319-(8*LEN(B$)):GOTO 1230
DG 1220 DRAWTO 0,Y+COS(P2)*R:X1=0
JW 1230 Y1=INT(Y+COS(P2)*R):GOSUB 1800
NH 1240 IF COUNT=0 THEN 1350
JZ 1250 NEXT T
BC 1260 P2=(360-P1)/2
PA 1270 P3=360-P2
WI 1280 IF P3<=180 THEN DRAWTO 319,Y+COS(
   P2)*R:GOTO 1250
ZT 1290 PLOT X+SIN(P3)*R,Y+COS(P2)*R:DRAW
   TO 0,Y+COS(P2)*R
KZ 1300 ? "▸Enter NAME of field ";FIELD;"
   --";:INPUT B$
SP 1310 IF P3<=180 THEN X1=319-(LEN(B$)*8
   ):GOTO 1330
QA 1320 X1=0
XW 1330 Y1=INT(Y+COS(P2)*R)
BB 1340 GOSUB 1800
GZ 1350 ? "▸  Enter TITLE of chart"
KY 1360 ? "▸then press START to print"
NC 1370 ? "▸    or SELECT to EXIT."
NC 1380 ? "▸";:INPUT F$:IF LEN(F$)>30 THE
   N 1350
LX 1390 ? "K"
OR 1400 POKE 752,1
LZ 1410 POKE 82,(40-LEN(F$))/2
OW 1420 ? :? F$:POKE 82,2
TH 1430 IF PEEK(53279)=5 THEN RUN
LF 1440 IF PEEK(53279)=6 THEN GOSUB 30000
   :GOTO 1460
QU 1450 GOTO 1430
BC 1455 REM  LINE 1460: CHR$(27);CHR$(14)
    = 1029 CODE FOR ELONGATED PRINT
WJ 1460 LPRINT CHR$(27);CHR$(14);T$(1,18-
   (LEN(F$)/2));F$
NP 1470 RUN
FT 1480 END
OI 1699 REM  Circle
FW 1700 DEG :PLOT X,Y+R
GU 1710 FOR I=0 TO 360 STEP 3
DA 1720 DRAWTO X+SIN(I)*R,Y+COS(I)*R
FM 1730 NEXT I
AZ 1740 RETURN
KZ 1799 REM  Gr.8 Text
OG 1800 SCRN=PEEK(88)+256*PEEK(89):DIS=(X
   1/8)+(Y1-4)*40
OU 1810 LCN=SCRN+DIS
MK 1820 FOR CHAR=1 TO LEN(B$)
UX 1830 A$=B$(CHAR,CHAR):V=ASC(A$)
AA 1840 IF V>127 THEN V=V-128
PT 1850 IF V>31 AND V<96 THEN V=V-32:GOTO
   1870
WU 1860 IF V<32 THEN V=V+64
PC 1870 CL=57344+V*8
XU 1880 FOR BYTE=0 TO 7
WY 1890 POKE LCN+BYTE*40,PEEK(CL+BYTE)
SO 1900 NEXT BYTE
MQ 1910 LCN=LCN+1
IW 1920 NEXT CHAR
BA 1930 RETURN
JB 1999 REM  BAR CHART
RV 2000 FOR R=15 TO 0 STEP -1:SETCOLOR 1,
   0,R:NEXT R:TRAP 2000
VK 2010 GRAPHICS 8:SETCOLOR 2,0,0:SETCOLO
   R 1,0,15
YC 2020 COLOR 1
EQ 2030 X1=25:B$="-":FOR Y1=140 TO 8 STEP
    -8:GOSUB 1800:NEXT Y1
LN 2040 Y1=140:B$="|":FOR X1=32 TO 304 ST
   EP 8:GOSUB 1800:NEXT X1
VN 2050 PLOT 29,8
NV 2060 DRAWTO 29,139
TO 2070 DRAWTO 310,139
IG 2080 ? "▸Enter number of bars --";:INP
   UT BARS
LD 2090 IF BARS<1 OR BARS>35 THEN 2080
JO 2100 ? "▸Enter y axis minimum --";:INP
   UT MIN:IF MIN<0 OR MIN<>INT(MIN) THEN
   2100
MP 2110 ? "▸Enter y axis maximum --";:INP
   UT MAX:IF MAX<=MIN OR MAX>50 OR MAX>MI
   N+18 OR MAX<>INT(MAX) THEN 2110
OY 2120 X1=9:Y1=148
WF 2130 F$=" 0 1 2 3 4 5 6 7 8 9 10111213
   141516171819202122232425262728293031 32
   3334353637383940414243444546474849 50"
BS 2140 Y1=140:B$=F$(MIN+MIN+2,MIN+MIN+3)
   :GOSUB 1800:Y1=140
BM 2150 FOR R=MIN+2 TO MAX+1:B$=F$(R+R,R+
   R+1):Y1=Y1-INT(131/(MAX-MIN)):GOSUB 18
   00:NEXT R
QT 2160 F$=" 123456789111111111122222222 2
   23333333"
GR 2170 Y1=148:FOR R=3 TO BARS+3:X1=R*8:B
   $=F$(R-2,R-2):GOSUB 1800:NEXT R
OF 2180 F$="          0123456789012345678
   90123456":IF BARS<10 THEN 2200
GL 2190 Y1=156:FOR R=3 TO BARS+3:X1=R*8:B
   $=F$(R-2,R-2):GOSUB 1800:NEXT R
WZ 2200 FOR R=1 TO BARS
NL 2210 ? "▸Enter height of bar ";R;" --"
   ;:INPUT HEIGHT
HT 2220 IF HEIGHT<MIN OR HEIGHT>MAX OR HE
   IGHT<>INT(HEIGHT) THEN 2210
```

```
BL 2230 IF HEIGHT=MIN THEN 2290
JV 2240 Y=140
SA 2250 FOR E=MIN+2 TO (MAX+1)-(MAX-HEIGH
   T):Y=Y-(131/(MAX-MIN)):NEXT E:Y=Y+1
WK 2260 FOR T=1 TO 8:PLOT R*8+23+T,139
TI 2270 DRAWTO R*8+23+T,Y
KJ 2280 NEXT T
JQ 2290 NEXT R
BG 2300 COLOR 0:FOR T=135 TO 143:PLOT R*8
   +23+4,T:DRAWTO 319,T:NEXT T
GO 2310 ? "▸  Enter TITLE of chart"
KN 2320 ? "▸then press START to print"
MR 2330 ? "▸    or SELECT to EXIT."
MP 2340 ? "▸";:INPUT F$:IF LEN(F$)>30 THE
   N 2340
LM 2350 ? "K"
PI 2360 POKE 752,1
MQ 2370 POKE 82,(40-LEN(F$))/2
PN 2380 ? :? F$:POKE 82,2
TY 2390 IF PEEK(53279)=5 THEN RUN
QZ 2400 IF PEEK(53279)=6 THEN GOTO 2420
TI 2410 GOTO 2390
YN 2415 REM  LINE 2420: CHR$(27);CHR$(14)
    = 1029 CODE FOR ELONGATED PRINT
UJ 2420 LPRINT CHR$(27);CHR$(14);"          "
   ;F$
NE 2430 LPRINT :GOSUB 30000
DW 2440 ? :? :? :? "▸Enter name of x-axis
    --";:INPUT F$:IF LEN(F$)>20 THEN 2440
NP 2450 ? "▸Enter name of y-axis --";:INP
   UT T$:IF LEN(T$)>20 THEN 2450
CA 2460 LPRINT :LPRINT "               X-AXI
   S = ";F$;"    Y-AXIS = ";T$
FJ 2470 LPRINT :LPRINT
YB 2480 FOR R=1 TO BARS
AU 2490 ? "▸Enter name of bar ";R;" --";:
   INPUT F$
YU 2500 LPRINT "               ";R;" - ";F$
IY 2510 NEXT R
ND 2520 RUN
FH 2530 END
OO 2999 REM  LINE GRAPH
TZ 3000 FOR R=15 TO 0 STEP -1:SETCOLOR 1,
   0,R:NEXT R:TRAP 3000
VL 3010 GRAPHICS 8:SETCOLOR 2,0,0:SETCOLO
   R 1,0,15
YD 3020 COLOR 1
ER 3030 X1=25:B$="-":FOR Y1=140 TO 8 STEP
    -8:GOSUB 1800:NEXT Y1
LO 3040 Y1=140:B$="|":FOR X1=32 TO 304 ST
   EP 8:GOSUB 1800:NEXT X1
VO 3050 PLOT 29,8
NW 3060 DRAWTO 29,139
TP 3070 DRAWTO 310,139
RY 3080 FOR G=1 TO LINE
CC 3090 ? "▸Enter number of points --";:I
   NPUT POINTS
XT 3100 IF POINTS<1 OR POINTS>35 THEN 309
   0
PS 3110 ? "▸Enter y axis minimum --";:INP
   UT MIN:IF MIN<0 OR MIN<>INT(MIN) THEN
    3110
YR 3120 ? "▸Enter y axis maximum --";:INP
   UT MAX:IF MAX<MIN OR MAX>50 OR MAX>MIN
   +18 OR MAX<>INT(MAX) THEN 3120
PC 3130 X1=9:Y1=148
WJ 3140 F$=" 0 1 2 3 4 5 6 7 8 9 10111213
   141516171819202122232425262728293031 32
   33343536373839404142434445464748 4950"
BW 3150 Y1=140:B$=F$(MIN+MIN+2,MIN+MIN+3)
   :GOSUB 1800:Y1=140
BQ 3160 FOR R=MIN+2 TO MAX+1:B$=F$(R+R,R+
   R+1):Y1=Y1-INT(131/(MAX-MIN)):GOSUB 18
   00:NEXT R
QX 3170 F$=" 1234567891111111111222222222
   23333333"
EN 3180 Y1=148:FOR R=3 TO POINTS+3:X1=R*8
   :B$=F$(R-2,R-2):GOSUB 1800:NEXT R
XD 3190 F$="          012345678901234567 8
   90123456":IF POINTS<10 THEN 3210
DF 3200 Y1=156:FOR R=3 TO POINTS+3:X1=R*8
   :B$=F$(R-2,R-2):GOSUB 1800:NEXT R
NQ 3210 FOR R=1 TO POINTS
KF 3220 ? "▸Enter height of point ";R;" -
   -";:INPUT HEIGHT
MT 3230 IF HEIGHT<MIN OR HEIGHT>MAX OR HE
   IGHT<>INT(HEIGHT) THEN 3220
WA 3240 IF HEIGHT=MIN THEN Y=139:GOTO 328
   0
JZ 3250 Y=140
SE 3260 FOR E=MIN+2 TO (MAX+1)-(MAX-HEIGH
   T):Y=Y-(131/(MAX-MIN)):NEXT E:Y=Y+1
TU 3270 IF R=1 THEN PLOT R*8+27,Y
TZ 3280 DRAWTO R*8+27,Y
JR 3290 NEXT R
BH 3300 COLOR 0:FOR T=135 TO 143:PLOT R*8
   +23+4,T:DRAWTO 319,T:NEXT T
GP 3310 ? "▸  Enter TITLE of chart"
KO 3320 ? "▸then press START to print"
MS 3330 ? "▸    or SELECT to EXIT."
OF 3340 ? "▸";:INPUT F$:IF LEN(F$)>30 THE
   N 3340
LN 3350 ? "K"
PJ 3360 POKE 752,1
MR 3370 POKE 82,(40-LEN(F$))/2
PO 3380 ? :? F$:POKE 82,2
TZ 3390 IF PEEK(53279)=5 THEN RUN
SH 3400 IF PEEK(53279)=6 THEN GOTO 3420
TU 3410 GOTO 3390
ZE 3415 REM  LINE 3420: CHR$(27);CHR$(14)
    = 1029 CODE FOR ELONGATED PRINT
UK 3420 LPRINT CHR$(27);CHR$(14);"          "
   ;F$
NF 3430 LPRINT :GOSUB 30000
GS 3440 ? :? :? :? "▸Enter name of x-axis
    --";:INPUT F$:IF LEN(F$)>20 THEN 3440
QC 3450 ? "▸Enter name of y-axis --";:INP
   UT T$:IF LEN(T$)>20 THEN 3450
CB 3460 LPRINT :LPRINT "               X-AXI
   S = ";F$;"    Y-AXIS = ";T$
FK 3470 LPRINT :LPRINT
WV 3480 ? "▸Enter name of point 1"
AS 3490 ? "▸Or RETURN for no names --";:I
   NPUT F$:IF F$="" THEN 3550
PH 3500 LPRINT "               ";1;" - ";F$
OI 3510 FOR R=2 TO POINTS
EC 3520 ? "▸Enter name of point ";R;" --"
   ;:INPUT F$
ZE 3530 LPRINT "               ";R;" - ";F$
JI 3540 NEXT R
NN 3550 RUN
FR 3560 END
TN 29999 REM  SCREEN DUMP [1029]
              CHANGE AS APPROPRIATE
SN 30000 SCREEN=PEEK(88)+256*PEEK(89):IOC
   B=1
DO 30010 OFFSET=60
OX 30020 ON PEEK(1570)=6 GOTO 30030:RESTO
   RE 30060:FOR I=0 TO 171:READ A:POKE 15
   36+I,A:NEXT I
EU 30030 FOR PR=0 TO 24:CLOSE #IOCB:OPEN
   #IOCB,8,0,"P:":? #IOCB;CHR$(27);"9";CH
   R$(27);"A";CHR$(1);CHR$(64+OFFSET);
YO 30040 ON OFFSET=0 GOTO 30050:FOR I=1 T
   O OFFSET:? #IOCB;CHR$(0);:NEXT I
PF 30050 DUMMY=USR(1536,IOCB,SCREEN):SCRE
   EN=SCREEN+280:NEXT PR:RETURN
ZG 30060 DATA 104,104,104,10,10,10,10,141
   ,182,6,104,141,173,6,104
QQ 30070 DATA 141,172,6,169,0,141,183,6,3
   2,54,6,24,173,94,6,105,1,141,172,6,173
DQ 30080 DATA 95,6,105,0,141,173,6,238,18
   3,6,173,183,6,201,40,208,226,96,162,0,
   24
RO 30090 DATA 173,173,6,157,95,6,173,172,
   6,157,94,6,105,40,141,172,6,173,173,6,
   105
QH 30100 DATA 0,141,173,6,24,138,105,6,17
   0,224,37,144,221,162,0,14,255,255,62,1
   74,6
OT 30110 DATA 14,255,255,62,174,6,14,255,
   255,62,174,6,14,255,255,62,174,6,14,25
   5,255
KD 30120 DATA 62,174,6,14,255,255,62,174,
   6,14,255,255,62,174,6,232,224,8,208,20
   9,174
XQ 30130 DATA 182,6,169,11,157,66,3,169,1
   74,157,68,3,169,6,157,69,3,169,0,157,7
   3
OA 30140 DATA 3,169,8,157,72,3,32,86,228,
   96
DW 30150 RETURN
```

Epson screen dump for Graph Maker on page 18

DON'T MISS THESE GREAT BACK ISSUES!

PAGE 6 back issues represent an excellent way of increasing the enjoyment of your Atari with articles to enlighten you, programs to type in and reviews of software to guide you. Almost all of the content of past issues will be as fresh and relevant today as when it appeared – increase your enjoyment now, before it's too late! Disks are available for all issues, containing all the 8-bit programs from each issue ready to run, and they often include bonuses not found in the magazine.

ISSUE 20 – GRAPHICS SPECIAL. A super special issue with a graphics theme. Draw some masterpieces with GRAPHICS WORKSHOP and explore your graphics potential with Colour Palette, Picloada, Colour Attributes and CIO Slideshow. An in-depth review of Printshop and Graphics Art Department, the final part of Display Lists and the Adventure column. 11 pages devoted to the ST plus a colour feature ATARI ART and ST GALLERY. And there's more! BLOCKBREAKER is one of the best games to have been published in any magazine. Don't miss it!

BONUS DISK AVAILABLE – includes BONUS PICTURES for Graphics Workshop

ISSUE 21 – A packed issue with games, TRAIN CRAZY, REVENGER and FORKLIFT. Utilities SCALEMASTER, QUICK DISASSEMBLER and Measuring Temperature. Programming hints with Doing The Impossible, Error 8 Solved and THE GUIDE TO ERROR CODES. Reviews of Flight Simulator II, Hitchhiker's Guide to the Galaxy, and the latest Adventures. For the ST a DEGAS to NEO converter, Lattice C reviewed and reviews of a whole host of software.

DISK AVAILABLE. All programs ready to go.

ISSUE 22 – More serious users will enjoy SMARTSHEET, a Visicalc like type-in spreadsheet, plus our review of Paperclip whilst gamesters will puzzle over TRICKY CUBES and try to survive HIDDEN DEPTHS. The Guide to Error Codes is concluded and there are articles on Fractals, Tape Problems and some less well known Adventures. Loads of reviews and some great new routines for Blockbreaker. ST users will find out how to program Sprites and can read reviews on Time Bandit, Pro-Fortran 77, VIP Professional and more.

BONUS DISK AVAILABLE – DOUBLE SIDED! Contains TWO versions of TRICKY CUBES and new versions of BLOCKBREAKER.

ISSUE 23 – Another superb machine language game WATER SKI SCHOOL will test your reflexes. WORDSEARCH will challenge those who like puzzles and other listings include SUPERCLOWN and the utilities XREF and VERIFY. A huge review of Ultima IV heads a comprehensive review section and Going Online Part 1 will let you know if telecommunications is for you. ST owners can discover how to get a bigger screen on their colour monitor and read reviews of Zoomracks, Sierra On-Line adventures and Pro-Pascal amongst others. Also, is it worth adding a 5¼" drive to your ST?

BONUS DISK AVAILABLE. Contains TWO BONUS PROGRAMS!

ISSUE 24 – The biggest issue so far published! Great ST section with info about ST disks and cartridges and loads of reviews. For 8-bit users there is MUNCHY MADNESS, the best game we have ever published plus a super cheque book utility AUTOCHECK. Plus all about checking your disk drive, another game called FLYING HIGH, more utilities, reviews of RAMBIT, Adventure games and lots more. Too much in this issue to list fully!

DISK AVAILABLE – Don't miss MUNCHY MADNESS, the best game we have published so far!

ISSUE 25 – Another biggie! A must for 1029 printer owners with 3 great utilities including a SCREEN DUMP. A super Japanese chess game called SHOGI, a type in REVISION C BASIC, a full feature on disks and more. For ST, type in OTHELLO, reviews of LEADER BOARD and MEAN 18, Hints and Tips and several other reviews and articles.

DISK AVAILABLE – ALL THOSE 1029 PROGRAMS READY TO GO!

ISSUE 26 – SOLID MODELLING is one of the best non-game programs we have published. Be creative! Other programs include SOURCE WRITER for machine code programmers, FLEXIBLE FINGERS to help you type, NUTS and more. Reviews of TRIVIAL PURSUIT, DVC/65, SPEEDSCRIPT and much, much more. ST users can learn all about HARD DISKS, FAST BASIC, TYPESETTER ELITE, DEGAS ELITE and read reviews on a whole lot more software.

BONUS DISK AVAILABLE – DOUBLE SIDED! TWO virtually full sides with BONUS SCREENS for SOLID MODELLING!

ISSUE 27 – Some cracking listings for the 8-bit. In GREAT BRITAIN LTD. you can be the Chancellor and help run the country. COMPUTER GAMMON is a great Atari version of backgammon and there's ANTS IN YOUR PANTS, DISK COMMAND and others. There is a feature on word processing and stacks of reviews. The ST section includes an in-depth review of ART DIRECTOR and a neat little program to put scrolling stars on your screen! Lots of reviews including HABAVIEW, K-SPREAD 2, K-WORD and many more.

DISK AVAILABLE – some L-O-N-G LISTINGS!

ISSUE 28 – Extend the incredible original Munchy Madness with the MUNCHY MADNESS SCREEN DESIGNER, play GREEDY CATERPILLARS with a friend, teach your children with MOST HEART MATHS or make up some crosswords with XWORD. A long feature on flight simulation programs, hints on ZORK and loads of reviews. For ST users, the first in a series of USING GEM from C plus FLIGHT SIMULATOR II reviews, new books from COMPUTE! and a whole stack of reviews.

DISK AVAILABLE – Also contains the winning title screen from our competition.

ISSUE 29 – One that serious 8-bit users have been waiting a long time for – a great full feature database – MJDBASE plus an amazing story maker, STORYBOOK, that allows you to create illustrated stories. Then there's a great game from ANTIC called CLIFFHANGER and an AUTORUN maker and more. Cheat on commercial games with ZAPPING THE RIGHT BYTE and read stacks of reviews. The ST section has a type-in program, SCREEN GRABBER, which allows you to 'snatch' pictures of commercial games to disk, plus the next part in our GEM FROM C series and reviews of Superbase Personal, K-COMM 2 plus lots of games including Barbarian. Another big issue.

BONUS DISK AVAILABLE. DOUBLE SIDED. With BONUS story for STORYBOOK and STORYBOOK reader.

ISSUE 30 – A great follow up to Solid Modelling allows you to animate 3-D objects. Try 3-D ANIMATOR. How about a puzzle with LETTER CASTLE or an arcade style shoot-up from ANTIC called DESERT CHASE? Articles include an in-depth look at GUNSLINGER, Genealogy With Your Atari and First Steps on saving screens. Loads of reviews including AUTODUEL and P:R: CONNECTION. The ST section includes the continuing GEM series, CYBERSTUDIO, ZOOMRACKS II and loads of games and serious reviews including GFA BASIC, K-Roget, Jupiter Probe and more.

BONUS DISK AVAILABLE. DOUBLE SIDED with BONUS MACHINE LANGUAGE ADVENTURE only available on this disk!

ISSUE 31 – Our massive survey on all the WARGAMES available for the 8-bit Atari heads this issue which also includes a great type-in synthesiser listing called ORIGINAL SYNTH. Other listings include FONT FACTORY, a nice character editor and a challenging game called BOWL TRAP. A feature on SSI, more Tutorial Subroutines, a long feature on THE NEVERENDING STORY, reviews of ROADWAR 2000 and THE DUNGEON plus many more are also in this issue. ST SECRETS, a new series on ST programming begins with a look at sound and the ST reviews section includes IMG SCAN, BASE TWO, TEMPUS and many more.

DISK AVAILABLE – All the extra files for ORIGINAL SYNTH set up ready to run plus all the other listings.

All back issues are £1.20 each in the U.K., £1.95 for Europe or surface mail elsewhere and £2.75 for Air Mail outside Europe.

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GRAPH MAKER

EPSON SCREEN DUMP

This Graphics 8 screen dump may also be used as a stand alone listing or can be added to your own programs. It should work with any fully Epson compatible printer

```
MM 30000 REM ***************************
TO 30010 REM *    EPSON SCREEN DUMP    *
IL 30020 REM *          by             *
CI 30030 REM *      Phil Cardwell      *
CR 30040 REM * ----------------------- *
ZH 30050 REM *    PAGE 6 Magazine      *
NK 30060 REM ***************************
CG 30070 REM
OZ 30080 GOSUB 30140
KI 30090 REM Screen Dump Loop
HC 30100 FOR D=0 TO 39:SCREEN=191*40+SAVM
   SC+D:COPY=USR(1536,SCREEN,EPSON1,EPSON
   2)
GY 30110 ? #1;EPSON1$:? #1;EPSON2$:NEXT D
DO 30120 CLOSE #1:GRAPHICS 0:RETURN
TZ 30130 REM Program Initialization
OA 30140 TRAP 30220:DIM EPSON1$(964),EPSO
   N2$(964),LEADER$(4)
AM 30150 FOR OPERAND=1 TO 4:READ OPCODE:L
   EADER$(OPERAND,OPERAND)=CHR$(OPCODE):N
   EXT OPERAND
IX 30160 DATA 27,76,192,3
GH 30170 EPSON1$=CHR$(0):EPSON1$(964)=CHR
   $(0):EPSON1$(2)=EPSON1$:EPSON2$=EPSON1
   $
XP 30180 EPSON1$(1,4)=LEADER$:EPSON2$(1,4
   )=LEADER$
GG 30190 REM Screen Dump Data
II 30200 FOR OPERAND=1536 TO 1746:READ OP
   CODE:POKE OPERAND,OPCODE:NEXT OPERAND
DQ 30210 REM Initialize Printer
NU 30220 TRAP 40000:CLOSE #1:OPEN #1,8,0,
   "P:":? #1;CHR$(27);CHR$(64);CHR$(27);C
   HR$(51);CHR$(24)
JG 30230 EPSON1=ADR(EPSON1$):EPSON2=ADR(E
   PSON2$)
BY 30240 SAVMSC=PEEK(88)+PEEK(89)*256
DZ 30250 RETURN
CT 30260 DATA 104,104,133,204,104,133,203
   ,104,141,192,6,104,141,191,6,104
HW 30270 DATA 141,194,6,104,141,193,6,169
   ,1,133,207,169,191,133,208,160,0,177,2
   03,141,190,6,165,207
AJ 30280 DATA 240,28,169,0,133,207,173,19
   3,6,24,105,4,141,193,6,133,205,173,194
   ,6,105,0,141,194
TG 30290 DATA 6,133,206,76,95,6,169,1,133
   ,207,173,191,6,24,105,4,141,191,6,133,
   205,173,192,6
KZ 30300 DATA 105,0,141,192,6,133,206,32,
   137,6,32,146,6,32,160,6,32,137,6,32,16
   9,6,32,160
YV 30310 DATA 6,165,207,240,177,56,165,20
   3,233,40,176,2,198,204,133,203,198,208
   ,165,208,201,255,208,151
MI 30320 DATA 96,173,190,6,41,3,10,10
GG 30330 DATA 170,96,160,0,189,195,6,145,
   205,232,200,192,4,208,245,96,173,190,6
   ,74,74,141,190,6
YV 30340 DATA 96,160,0,189,195,6,10,10,10
   ,10,24,113,205,145,205,232,200,192,4,2
   08,238,96,0,0,0,0,0
WK 30350 REM SHADE DATA
BU 30360 DATA 15,15,15,15
DV 30370 DATA 10,0,5,0
SW 30380 DATA 10,5,10,5
RU 30390 DATA 0,0,0,0
```

INFOCOM



Are Infocom lagging behind in innovation or have they got something up their sleeves? John Sweeney takes a look at their most recent adventures and discovers a possible change in direction

AHEAD OR BEHIND?

Infocom continue to produce some of the best text Adventures in the world. They started off 1987 well with the excellent Bureaucracy and Planetfall, both worthy of a place in any adventurer's collection. They continued with Lurking Horror and Plundered Hearts, both of which are, again, straight text Adventures of the kind at which Infocom have excelled for so many years. Admittedly the four adventures are all very different, partly because of the different styles of the authors, but also because they cover a diverse range of genres – The Romantic Novel, Gothic Horror, Science Fiction, and ... um ... well, Douglas Adams' Bureaucracy is just Different!

Despite all being excellent games, they are all straight text Adventures in the world-renowned standard Infocom style. There are no surprises in the presentation, game-play or facilities of any of these games. There has been talk for some time that Infocom may be beginning to fall behind in technical innovation and the use of the power of the 16 bit machines but then came Nord and Bert and, hopefully by the time you read this, Beyond Zork. Both are innovative, but in very different ways.

Let's take a look at each of these most recent adventures.

THE LURKING HORROR

The Lurking Horror is Infocom at its best (its old best, that is! – mayhap Beyond Zork, previewed later, will lead us on to new even dizzier heights!). It was written by Dave Lebling who co-authored the original Zorks (I, II, III and Enchanter) and also wrote Starcross, Suspect and Spellbreaker on his own. With a pedigree like that you know its going to be good! This time he has chosen to write a horror story full of monsters from Lovecraft's worst nightmares, complete with nasty descriptions of all the things which happen to you if things go wrong (which they do frequently!), such as the delicious descriptions of what the monsters do to you if you die: "Something gnawing on your tongue thinks its pretty wonderful!". (Actually when I first mentioned that line to my wife she thought I was talking about a scene from the Romantic Novel 'Plundered Hearts'!)

The adventure is set on the campus of the GUE Tech. No, it's not a coincidence that George Underwood Edwards and Great Underground Empire, (setting of all the Zorks), have the same initials, but sad to say, there aren't any Grues. Most of the action does in fact take place deep below the campus when, while investigating the disappearance of various members of the university, you discover that the underground passages linking the various buildings of GUE Tech lead deeper than anyone suspected. You soon discover they lead to blood-stained altars, pits with terrifying inhabitants and ancient tombs. It all seems to have something to do with the Alchemy Department! Along the way you pick up a companion to help you in your troubles, a sort of pet, but I won't reveal what, just that Mr Lebling has a most gruesome mind – yeucccch!

The packaging is up to Infocom's usual high standard and includes a helpful manual, a Fresher's Guide to GUE, your student ID Card, and your very own personal monster, which sticks very nicely to the side of an ST screen!

Since Infocom stopped classifying their adventures I don't believe they have produced any as hard as the ones they used to class as Advanced or Expert, I would class this as a good Standard Level adventure. The atmosphere is great, the puzzles are interesting, the implementation is excellent. Thoroughly recommended to all who love adventures and/or horror stories.

PLUNDERED HEARTS

Trembling, you fire the heavy arquebus. You hear its loud report over the roaring wind, yet the dark figure still approaches. The gun falls from your nerveless hands. "You won't kill me," he says, stepping over the weapon. "Not when I

am the only protection you have from Jean Lafond." Chestnut hair, tousled by the wind, frames the tanned oval of his face. Lips curving, his eyes rake over your inadequately dressed body, the damp chemise clinging to your legs and heaving bosom, your gleaming hair. You are intensely aware of the strength of his seaworn body, of the deep sea blue of his eyes. And then his mouth is on yours, lips parted, demanding, and you arch into his kiss...

He presses you against him. "But who, my dear", he whispers into your hair, "will protect you from me?". So starts Plundered Hearts!

You play the part of a beautiful and genteel Englishwoman in the late 17th Century, travelling to the West Indies to care for your ailing father. The story begins with your ship being attacked by pirates. You are carried off by a dashing pirate, Captain Nicholas Jamison – better known as the Falcon! He claims to be from your father, but can you trust him? Even worse, can you trust yourself in his presence?

After the introduction which covers your first meeting with the Falcon, you find yourself alone in a cabin on the Falcon's ship, which is anchored off the coast of the isle of St. Sinistra. The Falcon claims to be visiting Jean Lafond in an attempt to rescue your father from him. You have been locked in your cabin, supposedly for your own safety. Unfortunately there appears to be a traitor in the crew: the ship is drifting on to the reefs, and if the reefs don't get you then when the fire in the stores reaches the gunpowder, the subsequent explosion will! This is SAFETY?

IF you survive all that you still have to reach the island and face further dangers such as treacherous pirates, a most efficient butler, savage crocodiles, and the evil villain Lafond.

Plundered Hearts is full of atmosphere. It really does read like a romantic novel, full of adventure on the high seas. There are, as is usual in Infocom adventures, lots of little touches to help the atmosphere, for instance the response to a blank line is "Prithee, pardon?", and to SAVE is "Aye-Aye"! The whole thing is very tongue-in-cheek, full of cliches and incorporating every scene you've ever seen in a swashbuckling Douglas Fairbanks movie. Even down to such lovely detail as (if you fail to escape from Lafond's bedroom): "Lafond pulls the sheets up to cover you both.... Waves crash against the base of the cliff.... You have suffered a fate worse than death!".

Experienced adventurers may find the game a little easy. I don't know if I was just very lucky, but on this one I beat my previous record for an Infocom game (6 hours for Witness) by completing Plundered Hearts in well under four hours. So, at its full price an experienced player may find it is not great value for money – if you are an experienced player looking for more of a challenge then I would recommend one of the older Advanced or Expert level Infocom games, but if you can afford Plundered Hearts it is great fun to play.

It is well written, not excessively deadly – it gives you plenty of warning that the ship is about to crash or explode – and it just won't let you do stupid things such as walking off cliffs or into crocodiles. It is full of humour and interesting puzzles and a number of the problems have two solutions to reduce the chance of your getting stuck. These variations can in fact lead to two slightly different endings – you haven't completely finished until you Live Happily Ever After!. Definitely a good Beginners/Standard Level Adventure.

NORD AND BERT COULDN'T MAKE HEAD OR TAIL OF IT

Nor, apparently can a lot of people when confronted with this rather offbeat game from Infocom! Nord and Bert LOOKS like a standard adventure, but plays rather differently! It accepts commands and gives responses in the normal way, it has locations which you can move between, items you can examine and pick up and it has lots of problems to solve but if you just try and play it like a normal adventure you won't get anywhere.

Although you do type in the occasional normal command (GO NORTH or GET BAG) most of the problems are solved by typing in puns, cliches, spoonerisms, well-known phrases or sayings, homonyms, or other such examples of verbal trickery!

There are eight scenarios. The first seven are completely independent. Effectively you have seven separate games, each one of which uses one form of 'verbal trickery' to resolve its puzzles. When you have finally completed all those you are allowed to play the eighth scenario. Whereas, in each of the first seven, once you have worked out which particular form of verbal trickery is being used in this game, you can concentrate on that one form, in the final part (Meet the Mayor) all the different puzzle types are mixed together so that it is much harder to work out what to do next. To help you understand the game it is probably best to give you a few samples from the instruction manual:

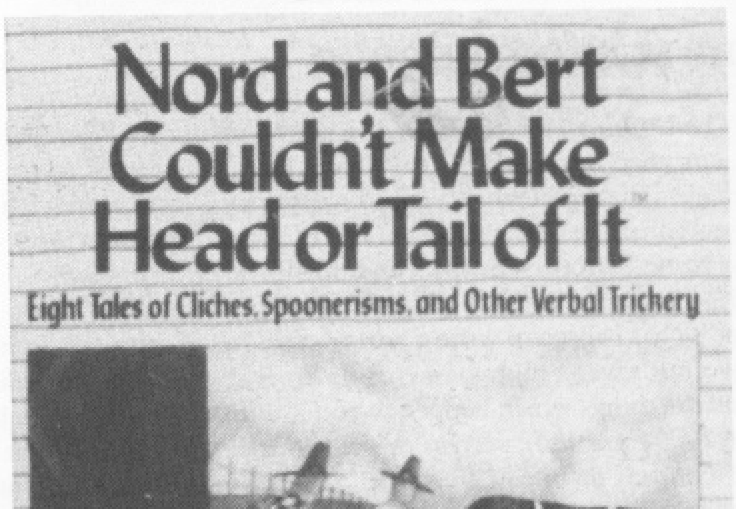
>TAKE NOTE
The tee holds the note firmly to the table.

>TAKE TEE
You grasp the tee and give it a series of mighty tugs but, as with Excalibur, it will take more than muscles to extract the tee from the table.

>TEA
The golf tee is swallowed up into a huge divot which then dissolves, leaving in its wake a steaming cup of oolong tea.

or

>LOOK AT THE STONE LAMP
There is a beautiful Mayan oil lamp that your father smuggled



out of Central America.

>LONE STAMP

The ancient Mayan relic flattens out and its edges become perforated leaving a lone stamp.

or

There is a freshly-burrowed molehill on the ground.

>MAKE A MOUNTAIN OUT OF THE MOLEHILL

There is a tremendous rumbling ... the molehill crumbles away ... mighty, jagged peaks emerge from deep underground.

The first of those is a Homonym (two words sounding the same), the second is a Spoonerism (mixing up the beginnings of words), the third is a cliche/ proverb/ saying.

Each of the games (apart from Meet the Mayor) can be played independently, and makes quite a good way of passing a few hours with a group of friends – this is definitely one where its worth getting as much help as possible. Although you should be able to get a lot of the wordplays eventually if you stick at it, I would be amazed if anyone actually managed all of them without help. Some are obscure, a few are American, and there are a couple which are not really very good, so you have to be lucky to spot them.

Infocom obviously realised that it was rather difficult, so they have very kindly incorporated a full set of Invisi-Clues into the game. At any time you may ask for HINT and get a list of the problem areas in the current scenario. You can select one of these and get a number of graded clues to help you with your problem. Sometimes just seeing the list of problem areas is sufficient to point you in the right direction.

A couple of the scenarios didn't quite seem to fit the 'verbal trickery' description as far as I was concerned, but most of them were good fun. There are quite a few clever puzzles to solve, and since most of them depend on wordplay they are mostly humourous. Even when you aren't successful in solving the problems the game has been programmed to respond with lots more verbal jokes to all your attempts!

One word of warning. For reasons best known only to Infocom, the game refuses to load in 40-column, low-resolution mode. It insists on using 80-columns. So if you use a small TV you may not be able to read the screen very easily. All other Infocom games (to, my knowledge, and with the possible (probable?) exception of Beyond Zork) work quite happily in low-resolution. Strange!

So, if you want a good 'adventure', DON'T buy this one. On the other hand if you like playing with words and are interested in a variety of amusing and frustrating challenges you will probably find Nord and Bert to be a worthwhile and unique experience.

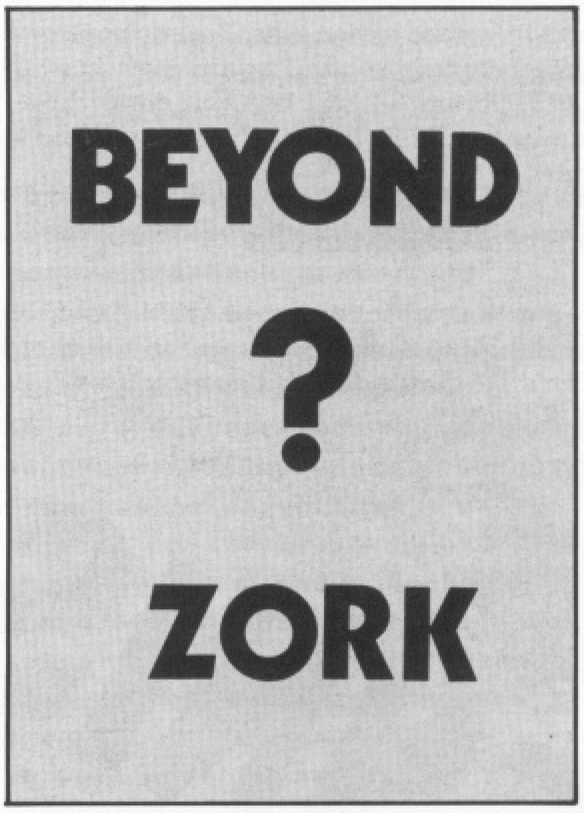
BEYOND ZORK

So to a preview of Beyond Zork. This one CAN be made to look like a standard adventure, but provides a whole host of new facilities as well. It is set in the same 'universe' as the previous seven Zork adventures (Wishbringer, Zorks I, II and III, Enchanter, Sorceror and Spellbreaker). Your quest is to rise from a humble beginning to become an adventurer capable of finding the mythical Coconut of Quendor! Im afraid that's all I know about the story at the moment, but I have seen some of the facilities:

DEFINE allows you to assign a commonly used command (complete or partial) to a Function Key to save you having to type. **NAME** is another command to save your typing – it allows you to give a name of your own choosing to any object in the game. **MONITOR** allows you to see bar charts of your six attributes in a window at the top of your screen, useful for viewing your progress (especially during a fight). These are the usual sort of Dungeons and Dragons style attributes, Strength, Charisma, Intelligence, etc. and affect your ability to progress through various parts of the game. **ZOOM** helps you with mapping. The screen will usually display a small map in the top right of the screen showing your current location, the adjacent rooms, and any exits of which you are aware. ZOOM allows you to see more rooms, but in less detail. **PRIORITY** tells the game what you want to see in the top window, for instance you can get it to always show the current inventory of what you are carrying. **UNDO** allows you to back out the previous command if something went wrong. **MODE** is for the purist. It gets rid of all on-screen maps, windows, monitors, etc. and makes the screen look just like an ordinary Infocom text Adventure. You can also let the game provide you with default attributes at the beginning instead of choosing them yourself.

Unfortunately, I haven't managed to get my hands on an ST copy yet – so I can't tell you yet whether or not all these new facilities make the game better or not. My guess is that it is going to make Infocom Adventures even more fun to play (if that is actually possible). I hope to be able to let you know in the near future!

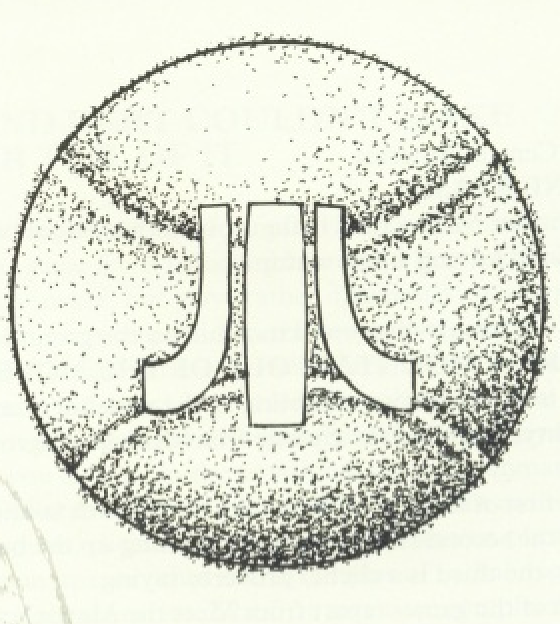
Infocom appear to be on the move – it can only be good news for adventurers – the next one is called Border Zone, apparently, I believe the setting is the Berlin Wall. I look forward to it. ●



TITLE	XL/XE	ST
The Lurking Horror	**£24.99**	**£29.99**
Plundered Hearts	**N/A**	**£29.99**
Nord and Bert Couldn't Make Head or Tail of It	**N/A**	**£29.99**
Beyond Zork	**??**	**£29.99(?)**

Anyone for

TENNIS



Tennis is one of those simple but addictive games for two players with each using a joystick. The aim is simply to return your opponent's shots by moving your player with the joystick. You gain a point each time your opponent misses and the first player to reach seven points is the winner. Pressing START begins a game and player 1 serves first. Thereafter service goes with the points. The fire button serves the ball.

TYPING IT IN

The program is a machine code file which is created on tape or disk by the Basic program listed here. Type in the program, using TYPO 3 to check it as you type, and then save it to disk or tape in the normal way.

If you are using a disk drive you will need a formatted disk with DOS written to it in Drive A. Run the Basic program and choose option 1. An autoboot listing will be created on your disk and the game can be run by simply re-booting.

If using cassette, load the original program and place a new tape in your cassette. Press PLAY and RECORD and then RUN the program. Choose option 0 and the machine code program will be written to your tape. You can now rewind the tape, switch off the computer and run the game by switching on with the OPTION and START keys held down. Press PLAY on the recorder and RETURN and the game will load and run automatically.

ACKNOWLEDGEMENTS

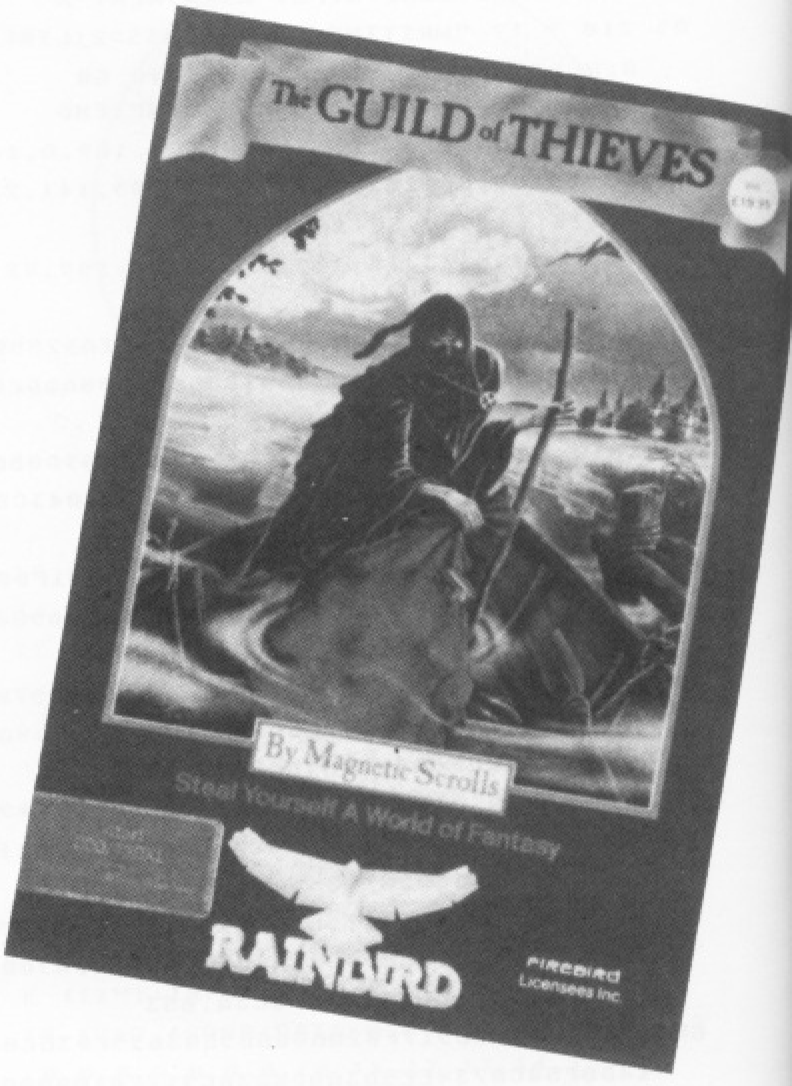
The program was written with the ATARI Assembler/Editor cartridge and the BASIC program listed here was created using Steve Hillen's 'Hexadecimal Code Generator' from MONITOR Issue 11.

```
AE 10 REM ****************************
XR 11 REM *          TENNIS          *
EM 12 REM *            by            *
IW 13 REM *    CHRISTOPHER JONES     *
RA 14 REM *--------------------------*
VY 15 REM * PAGE 6 MAGAZINE - ENGLAND *
AQ 16 REM ****************************
BM 17 REM
RN 18 REM ____ANALOG____
MD 19 REM ____LOADER____
YT 20 TRAP 20:? "MAKE CASSETTE (0) OR DIS
   K (1)";:INPUT DSK:IF DSK>1 THEN 20
UK 30 TRAP 40000:DATA 0,1,2,3,4,5,6,7,8,9
   ,0,0,0,0,0,0,0,10,11,12,13,14,15
LI 40 DIM DAT$(91),HEX(22):FOR X=0 TO 22:
   READ N:HEX(X)=N:NEXT X:LINE=990:RESTOR
   E 1000:TRAP 120:? "CHECKING DATA"
JG 50 LINE=LINE+10:? "LINE ";LINE:READ DA
   T$:IF LEN(DAT$)<>90 THEN 220
UU 60 DATLINE=PEEK(183)+256*PEEK(184):IF
   DATLINE<>LINE THEN ? "LINE ";LINE;" MI
   SSING!":END
LY 70 FOR X=1 TO 89 STEP 2:D1=ASC(DAT$(X,
   X))-48:D2=ASC(DAT$(X+1,X+1))-48:BYTE=H
   EX(D1)*16+HEX(D2)
FG 80 IF PASS=2 THEN PUT #1,BYTE:NEXT X:R
   EAD CHKSUM:GOTO 50
BG 90 TOTAL=TOTAL+BYTE:IF TOTAL>999 THEN
   TOTAL=TOTAL-1000
LR 100 NEXT X:READ CHKSUM:IF TOTAL=CHKSUM
    THEN 50
MO 110 GOTO 220
ZR 120 IF PEEK(195)<>6 THEN 220
EQ 130 IF PASS=0 THEN 170
MY 140 IF  NOT DSK THEN 160
SE 150 PUT #1,224:PUT #1,2:PUT #1,225:PUT
    #1,2:PUT #1,0:PUT #1,52:CLOSE #1:END
IJ 160 CLOSE #1:END
IS 170 IF  NOT DSK THEN 200
GO 180 ? "INSERT DISK WITH DOS, PRESS RET
    URN";:DIM IN$(1):INPUT IN$:OPEN #1,8,0
    ,"D:AUTORUN.SYS"
VY 190 PUT #1,255:PUT #1,255:PUT #1,0:PUT
    #1,52:PUT #1,128:PUT #1,58:GOTO 210
```

```
SD 200 ? "READY CASSETTE AND PRESS RETURN
   ";:OPEN #1,8,128,"C:":RESTORE 230:FOR
   X=1 TO 40:READ N:PUT #1,N:NEXT X
QS 210 ? :? "WRITING FILE":PASS=2:LINE=99
   0:RESTORE 1000:TRAP 120:GOTO 50
MI 220 ? "BAD DATA: LINE ";LINE:END
OY 230 DATA 0,14,216,51,255,51,169,0,141,
   68,2,169,60,141,2,211,169,109,141,231,
   2,133,14,169,58,141,232,2
FN 240 DATA 133,15,169,0,133,10,169,52,13
   3,11,24,96
AZ 1000 DATA A9DE8D3002A9368D3102A9288DC4
   02A90E8DC502A9008DC6028DC802A96A8DC002
   8DC1028DC202A9408D07D4A9,966
GX 1010 DATA 2A8D2F02A9008D08D08D09D08D0A
   D0A900A0009900409900419900429900 43C8D0
   F1A92485B485B5A90085B085,736
EE 1020 DATA B1A907A235A050205CE4AD1FD0C9
   06D0F9A000B98E3699FD36C8C014D0F5A90085
   B2A9108D5D3A8D6C3AA9308D,460
TC 1030 DATA 00D0A9C88D01D0A6B4A000B97D36
   9D1A42E8C8C008D0F4A6B5A000B985369D9A42
   E8C8C008D0F4A9028D1DD0A5,644
ZF 1040 DATA 0185B0A5B2D017AD10D0D0FBA930
   85B3A90085B8A5B418690285B64CE634AD11D0
   D0FBA9C885B3A90185B8A5B5,919
JU 1050 DATA 18690285B6AD0AD2290185B7A900
   85BA85BBA90185B985B1A5B9D0FCA6B6A9009D
   1C43A5B2F01AEE6C3AAD6C3A,653
BF 1060 DATA C917F02AA000B9B63699FD36C8C0
   14D0F54CB734EE5D3AAD5D3AC917F010A000B9
   A23699FD36C8C014D0F54CB7,714
RH 1070 DATA 34A90085B0A000B9CA3699FD36C8
   C014D0F54C6434A5B0D0034C62E4AD00D32903
   C902F007C901F00E4C7C35A6,105
KX 1080 DATA B4F004CACA86B44C7C35A6B4E044
   F004E8E886B4AD00D32930C920F007C910F00E
   4CA135A6B5F004CACA86B54C,260
YS 1090 DATA A135A6B5E044F004E8E886B5A6B4
   A000B97D369D1A42E8C8C008D0F4A6B5A000B9
   85369D9A42E8C8C008D0F4A5,844
GU 1100 DATA B1D0034C62E4A900854DAD0ED029
   03F00DA90185BAA5B84901 85B88D1ED0A5B8D0
   14A6B3E0C8D007A90085B24C,430
HZ 1110 DATA 7136E8E886B34C0936A6B3E030D0
   07A90185B24C7136CACA86B3A5B38D02D0A5B7
   D015A6B6A9009D1C43CA1006,51
AG 1120 DATA A90185B785BA86B64C3D36A6B6A9
   009D1C43E8E047D008A90085B7A90185BA86B6
   AD8D369D1C43A5BAD007A5BB,703
PV 1130 DATA D0124C62E4A9798D00D2A98E85BC
   85BBA90085BAC6BCC6BCA5BCC980D004A90085
   BB8D01D24C62E4A90085B18D,941
DG 1140 DATA 01D285B94C62E400001818181800
   000000181818180000184040404040404034 25
   2E2E29334040404040404033,308
JO 1150 DATA 25323625404034252E2E29334040
   40404040404040404040404034252E2E293340
   40332532362540404040 4027,772
FK 1160 DATA 212D2540402F3625324040404040
   70707047FD3602020202020202020202020202
   0202020202020202020641DE36,626
MJ 1170 DATA 4040404040404034252E2E293340
   40404040404080808080808080808080808080
   80808080808080808080808080,995
NC 1180 DATA 8080808080808080808080808080
   80000000000000000000000000000000000000
   00000000000000000000000000,915
BV 1190 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
AW 1200 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
AZ 1210 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BC 1220 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BF 1230 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BI 1240 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BL 1250 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BO 1260 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BR 1270 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BU 1280 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BX 1290 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
AY 1300 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BB 1310 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BE 1320 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
BH 1330 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   00000000000000000000000000,915
FO 1340 DATA 0000000000000000000000000000
   00808080808080808080808080808080808080
   80808080808080808080808080,755
ZJ 1350 DATA 8080808080808080808080000000
   00000000000000000000000000000000000000
   00000000000000000000000000,35
MK 1360 DATA 00000000002F2E251A1040404040
   40404040404034372F1A10E002E10200340000
   00000000000000000000000000,548
```

The GUILD of THIEVES

Magnetic Scrolls/Rainbird
XL/XE with 1050 or ST
Price £19.95/£24.95



Reviewed by John Sweeney

Magnetic Scrolls started well with their Pawn and are now rapidly establishing themselves as a major force in the world of computer adventures. Their second offering, The Guild of Thieves, I found even better than the first.

In its plot the Guild of Thieves is cast in perhaps a more traditional mold than the Pawn. Your objective is much more straightforward – find all the treasures and bring them back to your starting place. They have added a nice twist by casting you as a thief by profession, and they have located the game in their rapidly developing realm of Kerovnia so there is plenty of background material to flesh out their fantasy world and make it seem more realistic. Most of the instruction manual is devoted to humorous articles about The Guild of Thieves and its origins, and the descriptions of the game locations add to this to provide an interesting background to the game.

I recently had a letter from Allan Palmer of Basingstoke (now there's a place to visit if you want some practice at solving mazes!), who complained about the linearity of games like the Hitchhiker's Guide to the Galaxy, where, at least for the first part of the game, you only have one route to follow and if you get stuck then there is nothing else to try. Well, The Guild of Thieves is the exact opposite. As long as you can reach the river bank, get the castle open and find your lamp, all of which you can do very easily in the first six moves, then you have an enormous selection of places and puzzles to choose from. You can visit about sixty locations (roughly half the total), by simple commands such as LOOK IN, UNDER and BEHIND, OPEN and EXAMINE you will find over forty acquirable artifacts plus lots of information – make copious notes – there are clues hidden everywhere! Furthermore, once you have found all those artifacts, you will also have found plenty of problems. The nice thing is that at least a dozen of them are independently soluble. This means that there are always lots of things to try and you shouldn't get really stuck for some time.

Of course there are some problems which require you to crack other ones first, and there are some which are actually insoluble (unless you happen to have located the thermonuclear device which you also needed in the Pawn and doesn't seem to be in this game either!). The difficulty is of course in knowing which problems are soluble and which ones aren't! Never spend too long on a problem until you are sure you have explored everywhere and at least made some attempt at every problem!

The quality and variety of the problems is excellent, ranging from simple ones which you will kick yourself for failing to solve immediately, right through to complex logic problems which, once you have all the information, you can solve away from the computer just by thinking about them. I especially enjoyed the problems involving the Poisonous Jumper Spider, the 'maze' of strange Cubical Rooms, the way to make the Champagne Bottle explode without killing yourself, how to get inside the Bank, and the Weighing Scales which sets off an alarm if you try and take the treasure off it!

The Guild of Thieves has a wide vocabulary, an excellent parser and lots of entertaining responses to your attempts to survive in this dangerous world. On three or four occasions, though, I was slightly frustrated by the fact that, even when I had correctly worked out the solution to a problem, I had difficulty in getting it to understand what I wanted to do. My subjective feeling is that it is better than the Pawn in this respect, but you may still find that there will be cases when you need to persevere with numerous attempts at phraseology before you succeed. Hopefully this will continue to improve in future adventures.

Also, on the negative side, unfortunately for the XL owner, the game was written to use the power of the ST, especially in terms of memory usage. On the ST all responses are sub-second and it is a great adventure. But on the XL if you have the graphics on in order to see the pictures of the locations then you will get an average response time of thirty seconds as it frantically loads overlays into memory. The game implements a useful key-ahead buffer (but watch out it's only thirty characters long) and you can easily type in the next four commands – this will mean you have to wait two minutes for it to finish responding! – I found this made the game unplayable. Fortunately you can improve this by turning off the graphics. Although you will still get the occasional twenty second response, most of the responses will now be significantly better, and although still frustrating when you see the ST working, the game now becomes playable. *(N.B. If your diskette is date*

stamped before October 1987 you will find that you still get thirty second responses all the time on an XL – Magnetic Scrolls did their final testing on an XE and didn't realise that they had a bug in it which failed to reclaim memory. When I pointed this out to them at the PCW Show they kindly fixed it and sent me a new version – by the time you read this that new version should be generally available. If you have an old copy please take it back to your retailer and ask them to replace it.) Another deficiency for the poor XL/XE owner is that they failed to squeeze in the Restore function after a Death – you have to Restart and then Restore taking over one and a half minutes on an XL – since Death, in the form of the Gatekeeper, the Bees, Hot Coals, Colourful Floors (!?), Explosions, Ice Snakes, Poisonous Spiders, Wells, Rats, Bears, and various other Death Traps abound throughout the land of Kerovnia, this can be a trifle frustrating. Still, I suspect that is the price we are going to have to pay if we humble XL owners wish to play all the games being developed for the 16-bit machines. Just as the cassette based machine has been left behind in the development of bigger and better games, it is inevitable that the 8-bit machine will eventually fade. Full marks to Magnetic Scrolls for at least providing a version of the game for the 8-bit range!

As far as the graphics are concerned I personally don't find that they add a lot to an adventure unless they form an integral part of it (e.g. the King's Quest series) but if you like pictures with your adventures then, yes, The Guild of Thieves has excellent pictures on the ST – and does the best it can for the XL/XE. In The Guild of Thieves I found that not only did the pictures not add anything, but they actually detracted from the gameplay. For example, the most prominent items in the pictures of the Temple and the Kitchen are the Pillars and the Table. Naturally enough I tried to EXAMINE PILLARS and TABLE. But they don't actually exist in the game! By taking notice of the pictures I was actually wasting my time!

I would even go so far as to say that Infocom (yes, the Text Only people) have more graphics in their adventures than Magnetic Scrolls do. True they never switch into a 'graphics mode'. But they do, where necessary, use characters on the screen to represent graphics as an integral part of the game. Examples are the maze map in Hollywood Hijinx, the display of your current position in the Royal Puzzle in Zork III, the computer displays in Bureaucracy, and especially the Sonarscope in Seastalker where the upper half of the screen shows a map of your location, either in the harbour or chasing the sea monster, and your normal text entries in the lower part of the screen cause the upper half to scroll to show your new position. While we're on the subject of Infocom it may also be worth pointing out that the GO TO command which other reviewers have been hailing as a wonderful new innovation in Guild of Thieves and Knight Orc was being used by Infocom back in 1984 in games like Suspect!

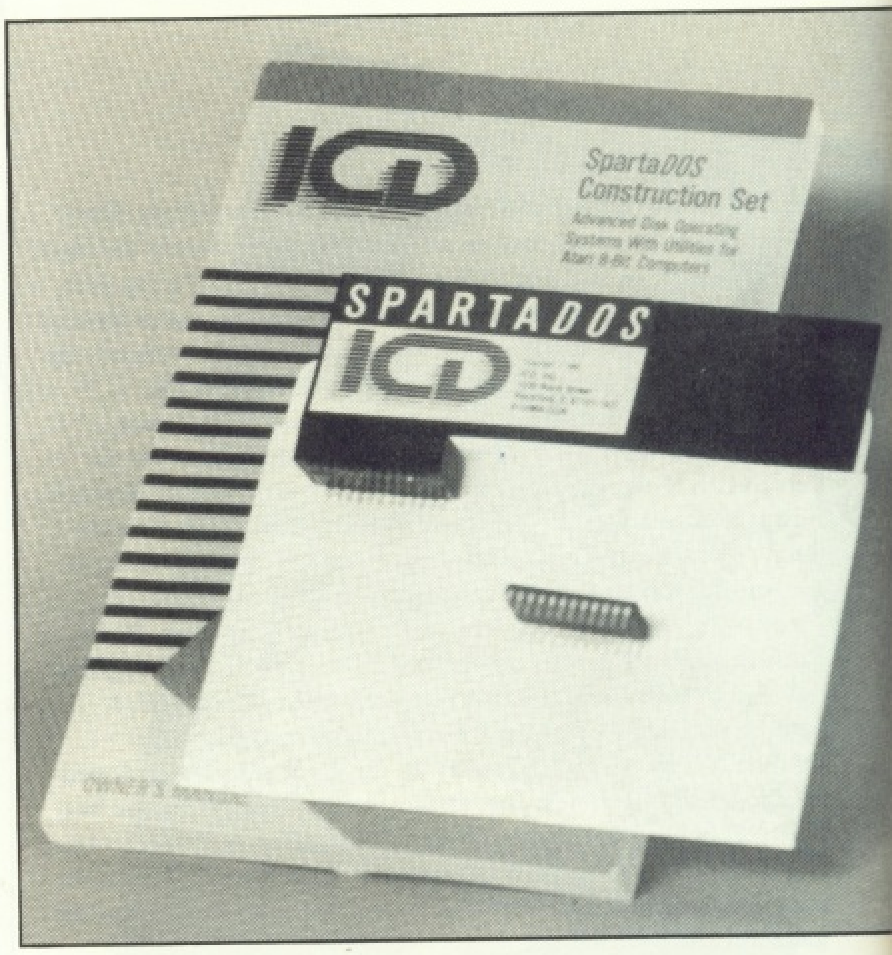
But enough about Infocom – they have had ten years and thirty games to get their act together. For Magnetic Scrolls to be producing this kind of quality on only their second game is a remarkable achievement.

All in all, The Guild of Thieves is an excellent Adventure – a must for all ST owning adventure players (and probably XE's although I haven't seen it working on one) and well worth considering for the XL as long as you accept its slight limitations in that environment. •

SpartaDOS Construction Set/ US Doubler

ICD/Frontier Software
£49.95

Reviewed by John S Davison



ICD are now producing some superb products for the 8-bit user, and the two reviewed here can only enhance their reputation further. The first is SpartaDOS, a replacement for Atari DOS which can be used on any 8-bit disk system. Better still, you can use it with its companion ICD product, the US Doubler, a hardware modification to add sparkling performance to your old 1050 disk drive. They are marketed in the UK by Frontier Software, who sell them for £29.95 each or, as reviewed here, in a special combined package for a very reasonable £49.95.

SpartaDOS is an advanced Disk Operating System for use on Atari 8-bit machines. In fact, it's a whole family of DOS programs bundled together in a package known as the SpartaDOS Construction Set. Its name is derived from the way you can build a system disk containing a version of SpartaDOS appropriate to your purposes and hardware configuration.

The package includes two 5.25" disks containing all the software, a comprehensive 161 page instruction manual, plus a 36 page supplement covering SpartaDOS V3.2, the latest version. The combined package also contains the US Doubler chip set.

FREE GAMES AND DEMO's!

The first disk contains four different versions of SpartaDOS V1.1 plus its command/utility files. These may be used with any 8-bit machine having 24K or more of memory. They're not directly compatible with Atari DOS 2.0/2.5, but the powerful copy utility provided can convert files from Atari DOS to SpartaDOS format and vice-versa. The four versions include the standard DOS with and without US Doubler high speed support and two cut down versions for use simply as game loaders or with AUTORUN.SYS files and cartridges.

Side B of the disk contains a working sample of the SpartaDOS binary file loader menu. Included with it are a set of seven really good public domain games, and three spectacular graphics demonstration programs – a nice bonus.

The second disk contains SpartaDOS V3.2 and two different flavours of V2.3. These versions will only run on XL/XE machines with 64K or more, and have a built-in Atari DOS 2.0/2.5 handler, making them directly compatible with Atari DOS files.

V3.2 is the latest version, including support for ICD's R-Time 8 realtime clock cartridge, BASIC XE, and hard disks amongst other things. The only difference between the two V2.3's is that at boot-up one gives priority to any installed cartridge software, while the other gives priority to SpartaDOS. Between them, all these different versions should cover virtually any requirement – you just have to decide which one is most relevant to your needs.

Double the density ... twice the speed ... worth the price?

EXPANDABLE SYSTEM

SpartaDOS provides you with vastly improved facilities in a number of different areas. Firstly, it gives additional features not found in Atari DOS such as use of volume labels, sub-directories (like ST folders), time and date stamping of files, command files, batch files, and keyboard buffering. It's got 45 extra commands – over and above the equivalents of Atari DOS menu items. And if you still feel SpartaDOS is missing something, the command file facility allows you to expand the system by writing your own commands.

Secondly, it improves on facilities provided in Atari DOS with such features as handling up to 8 disk drives, expanded capacity directories, locking at disk level as well as file level, and an excellent way of tagging files for copying as a batch instead of handling each one individually – a great time saver.

Thirdly, it provides support for virtually all types of disk drives in single (90K), 1050 enhanced (127K), true double density (180K), and even hard disks via the Supra hard disk interface. It handles RAMdisks too, and not only on the 130XE. When using BASIC on any XL/XE it will use the 8K of RAM under the BASIC ROM as a small RAMdisk.

Finally, it complements ICD's US Doubler hardware modification for the 1050 disk drive, giving true double density capability (180K per side) and a spectacular increase in speed.

Incredibly, even with all these additional facilities it gives you MORE free memory for BASIC programs than Atari DOS! This wizardry is achieved by holding some of the code in the memory under the OS ROM. How about that for efficient use of resources!

COMMANDS OR MENU?

SpartaDOS is essentially a command driven DOS, and in use it reminded me of IBM PC-DOS. If you don't like using commands then you can invoke the SpartaDOS menu function. This is worlds away from the simple Atari DOS menu, but it can make things easier for you.

You construct a SpartaDOS system disk by initialising it with the appropriate density and sector skew, and choosing the version of SpartaDOS you want to use. Sector skew determines how the sectors are physically mapped out onto a disk track, and the US Doubler requires a different skew from standard. US Doubler skewed disks will still work on an unmodified 1050, but slower than usual.

TWO CHIPS

The US Doubler itself looks most unexciting, but its effect is anything but! It consists of just two chips which you fit onto the 1050's circuit board, replacing the ones already there. In most cases you just unplug the old chips and insert the new ones however, Atari produced drives with two different types of chips, so if you have one of the less common types you also have to unsolder and resolder two jumper cables as part of the installation process.

The most difficult part of the exercise is disassembling the drive to get to the board and reassembling it afterwards, for which you need nimble fingers. ICD provide excellent instructions, so most people should be able manage it without too much hassle. The whole job took me under an hour, but I didn't have any soldering to do. Once the chips are installed SpartaDOS can take advantage of them straight away.

In practice, the US Doubler and SpartaDOS worked together flawlessly, happily transferring data back and forth between disks of different densities and between Atari DOS and SpartaDOS disks. The US Doubler handled the switching between densities completely transparently – you don't even know it's happening!

The US Doubler really makes itself felt when used with the high speed versions of SpartaDOS. The normal pedestrian beep-beep-beep of 1050 I/O is replaced with a frenzied torrent of beepery as the data screams to or from the 1050 at three times normal speed. It's truly amazing!

A NEW LEASE OF LIFE

You'll hardly recognise your 8-bit machine when used with these two products. It really will take on a new lease of life, gaining facilities, operating convenience and a performance sparkle you never thought possible. And they'll probably save you time and money too, particularly if you use a lot of disks.

I have only two criticisms. It's difficult to find things in the highly detailed manuals as there's no index and the built-in time-of-day clock runs slow, presumably because it's designed for use in the USA with a 60Hz VBI. Frontier Software really should have fixed this before selling the product in the UK.

In summary, if you're a disk user you'll benefit from SpartaDOS. If you're also a 1050 user, you can give your system a tremendous boost by using the combined SpartaDOS/US Doubler package. These products represent unbeatable value and provide you with the ultimate DOS upgrade for your 8-bit machine. Buy them. •

5. DOS FUNCTIONS FROM BASIC

Ian Finlayson continues his series with a longer routine for disk users that can be used as shown or expanded further

For the fifth in this series I have chosen a rather longer subroutine which, I hope, will be very useful. Some of you will already have a 'Minidos' of some sort but those who are newer to Atari should find the technique interesting as it uses Basic's special I/O function XIO which is not mentioned in the Basic Reference Guide!

This routine allows access to some of the functions of the Disk Operating System from Basic so you can carry out disk file manipulations without leaving your program. It may be appended to your program during the development phase and then removed if it is no longer needed once the program is complete. If you are ever stuck with a program to save and no formatted disk available this subroutine can be ENTERed into your program and used to format a disk.

THE XIO FUNCTION

The XIO function format is:

XIO A,#B,C,D,Filespec

A is the command number. We will be using 32 (rename), 33 (delete), 35 (lock), 36 (unlock) and 254 (format). Other available commands are 5 (get record), 7 (get character), 9 (put record), 11 (put character), 12 (close), 13 (status request), 17 (draw line), 18 (fill), 37 (note) and 38 (point).

#B is the device number as used in an OPEN command. In most applications it is ignored but it must be included and must have a # sign. Do not use the number of an I/O channel which is already open.

C and D are auxiliary control bytes. They are set to zero for most applications and we do not need to consider them for this routine.

Filespec is the name of the file being operated on, or in the case of Rename the name of the old and new files with a "," separator. If it is typed in it must be in quotation marks but in the subroutine we will use a string variable for the file name.

SUBROUTINE ANALYSIS

Lines 31400 – 31470 are secondary subroutines called by the main subroutine which follows. These are adapted from the keyboard input subroutines in Issue 31. The strange set of conditions in line 31440 is designed to allow input of A-Z 0-9 and also . , * and ? so that all file names including wild cards can be input.

Line 31480 - Enter the subroutine here, i.e. GOSUB to this line. This clears the screen, then checks the value of TT15. TT15 is zero if the subroutine is being run for the first time, otherwise it will have been set to 1 in line 31490 and line 31490 is skipped to avoid an error through trying to dimension the variables a second time.

Line 31490 - dimensions the variables needed in the subroutine and sets a trap to line 31500 for any I/O error during execution of the subroutine (such as a wrong file name).

Line 31500 - The destination for trapped errors, provides a suitable re-entry into the program, an error message and resetting of the trap for further errors.

Lines 31510 – 31540 get the directory from the disk and print it on the screen.

Line 31550 - asks which function you wish to carry out and goes to the subroutine at 31400 for a single character input.

Line 31560 - if C was selected (to change disks) a prompt is given to change the disk. The program then waits for a key press and returns to the start of the subroutine.

Lines 31570 – 31580 - If L or U were selected these lines are implemented otherwise the program skips to 31600. TT16 is the command number needed in the XIO function, for example, 35 for Lock and 36 for Unlock. A prompt is made for the filename and this is obtained from the subroutine at line 31420. "D:" is added to the front of the file name and the program jumps to line 31710.

Lines 31590 – 31610 - These lines carry out a similar routine for Renaming a file (Command No 32), but in this case the old filename is retrieved first and then the new name. The latter is appended to the former after a comma, so that TT11$ is of the form D:oldfile.ext, newfile.ext. The program then goes straight to the XIO function in line 31710.

Lines 31620 – 31640 are for Erase (Command number 33). As this is a destructive routine a prompt for a Y input is included to make doubly certain that it is intentional, then the program steps to 31480.

Lines 31650 – 31670 - This is similar to the erase routine but for Format (Command 254). Again a cautionary prompt is used.

Line 31680 - if Q is selected we quit the subroutine and return to the main program. This is the only way out of this minidos subroutine.

Line 31690 - if this line is reached then the original letter selected was not an active letter so the subroutine is started again, prompting for one of C,L,U,R,E,F or Q.

Line 31700 - this line is used by the Erase and Format selections to check for the Y response to the prompt. Any other key returns to the beginning of the subroutine.

```
RP 31399 REM **        PAGE 6          **
             ** SUBROUTINE TUTORIAL-5 **
             **   KEYBOARD INPUT       **
FF 31400 POKE 694,0:POKE 702,64:IF PEEK(1
   6)>127 THEN POKE 16,(PEEK(16)-128)
JL 31410 OPEN #2,4,0,"K:":GET #2,TT12:? C
   HR$(TT12):CLOSE #2:RETURN
LW 31420 OPEN #2,4,0,"K:":TT9$="":FOR TT1
   3=1 TO 12
UT 31430   POKE 702,64:GET #2,TT14:IF TT1
   4=155 THEN POP :GOTO 31460
TX 31440   IF TT14<42 OR TT14>90 OR TT14=
   43 OR TT14=45 OR TT14=47 OR TT14=64 OR
    (TT14>57 AND TT14<63) THEN 31430
WH 31450   ? CHR$(TT14);:TT9$(TT13,TT13)=
   CHR$(TT14):NEXT TT13
FX 31460 IF TT9$="" THEN POP :CLOSE #2:GO
   TO 31480
DH 31470 CLOSE #2:RETURN
MR 31479 REM **        PAGE 6          **
             ** SUBROUTINE TUTORIAL-5 **
             **   DOS FROM BASIC       **
IX 31480 ? "↖":IF TT15 THEN 31510
UJ 31490 DIM TT9$(12),TT10$(18),TT11$(27)
   :TT15=1:TRAP 31500:GOTO 31510
CG 31500 ? :? "I/O ERROR":? "PRESS ANY KE
   Y FOR DISC CONTENTS":TRAP 31500:GOSUB
   31400
HL 31510 OPEN #1,6,0,"D:*.*"
UY 31520 INPUT #1,TT10$:IF TT10$(5,8)="FR
   EE" THEN 31540
BK 31530 ? TT10$:GOTO 31520
KK 31540 CLOSE #1:TT10$=""
NN 31550 ? :? "Do you wish to ":? "CHANGE
    DISCS":? "LOCK, UNLOCK, RENAME, ERASE
   , FORMAT orQUIT? ";:GOSUB 31400
BA 31560 IF TT12=67 THEN ? "CHANGE THE DI
   SC THEN PRESS ANY KEY":GOSUB 31400:GOT
   O 31510
BK 31570 IF TT12<>85 AND TT12<>76 THEN 31
   590:TT16=35+(TT12=85):? :? "ENTER FILE
   NAME (no D:) ";:GOSUB 31420
NT 31580 TT16=35+(TT12=85):? :? "ENTER FI
   LE NAME (no D:) ";:GOSUB 31420:TT11$="
   D:":TT11$(3)=TT9$:GOTO 31710
WZ 31590 IF TT12<>82 THEN 31620
BX 31600 TT16=32:? :? "ENTER OLD NAME (no
    D:) ";:GOSUB 31420:TT11$="D:":TT11$(3
   )=TT9$
SS 31610 ? :? "ENTER NEW NAME (no D:) ";:
   GOSUB 31420:TT11$(LEN(TT11$)+1)=",":TT
   11$(LEN(TT11$)+1)=TT9$:GOTO 31710
CM 31620 IF TT12<>69 THEN 31650
KU 31630 TT16=33:? "ENTER FILE TO ERASE (
   without D:) ";:GOSUB 31420:TT11$="D:":
   TT11$(3)=TT9$
JF 31640 ? :? "PRESS Y TO ERASE FILE ";TT
   11$:GOTO 31700
AU 31650 IF TT12<>70 THEN 31680
GY 31660 TT16=254:TT11$="D:":? :? "PRESS
   Y TO FORMAT DISC - ALL FILES     WILL B
   E LOST"
CJ 31670 GOTO 31700
FX 31680 IF TT12=81 THEN TRAP 40000:RETUR
   N
FR 31690 GOTO 31480
JC 31700 GOSUB 31400:IF (TT12<>89 AND TT1
   2<>121) THEN 31480
CY 31710 XIO TT16,#1,0,0,TT11$:GOTO 31480
```

Line 31710 - at last the XIO function! It operates as described above. Once the operation is complete the program returns to the start of the subroutine and displays the disk contents anew so that the change can be seen immediately. From there another operation can be selected or Q to return to the main program.

DEVELOPMENT

This subroutine has been put together rather quickly and could, I'm sure, be compacted and improved. It was developed in this form to enable you to follow it easily. There are three obvious possibilities for development of the subroutine – first add more XIO functions, second improve the disk contents display to fit more files on the screen (see Issue 28) and third provide for multiple disk drive configurations.

That's it for this issue. As always any comments or suggestions for other routines are welcome. Write to **Ian Finlayson, 60, Roundstone Crescent, East Preston, West Sussex.**

DO YOU NEED A 16-BIT COMPUTER?

Phil Cardwell raises a few controversial points

Whilst browsing around the 1987 PCW Show, looking at the latest batch of ST software, a startling thought entered my mind 'Do I need a 16-bit computer?'. This thought preyed on my mind, almost converting a dedicated 8-bit fan to the way of the ST! After a great deal of deliberation I made my decision, to be revealed later, but for now I'll go over the factors that were given due consideration.

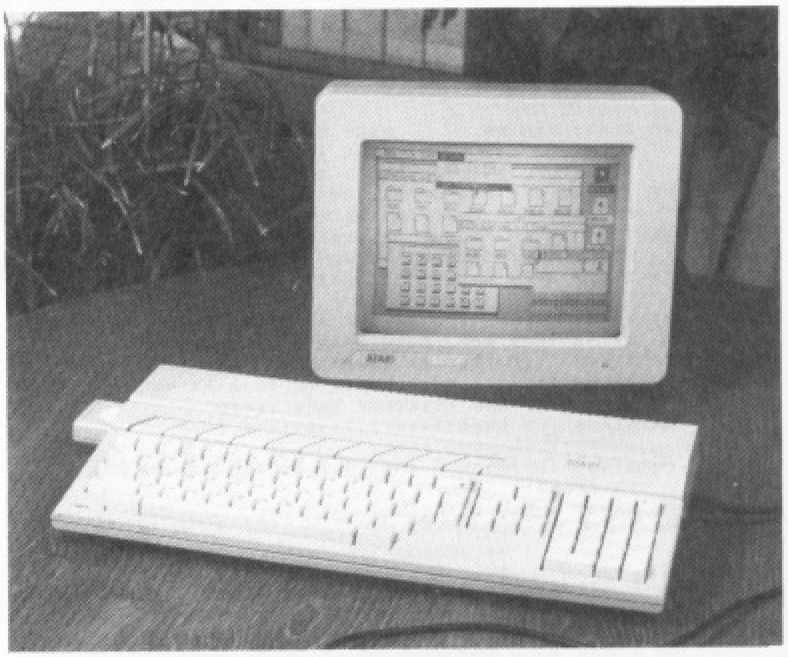
Price of a set-up was an initial factor. This works out about equal, though bargain hunters could make the 130XE and a 1050 disk drive a winner hands down. The cost of a 520 STFM constantly being brought down as dealers fight for trade, and the XE price increase by Atari, made this a very marginal argument. It could also prove the point that Atari want to give the 8-bit side less commitment and the ST's more support.

The 'Power without the Price' slogan brings us to the speed and power concept. There have been a lot of myths about the ST's operational speed, so lets have some facts. Theoretically, the ST should execute programs between 5 and 20 times faster than an 8-bit, dependant on the application being run. Without getting too technical, speed depends on the language being used and how well that language is implemented. As an example ST LOGO runs at approximately the same speed as 8-bit LOGO! Given that most people are BASIC programmers, lets clear the air in that department. With the exceptions of complex calculations and considerable disk Input/Output operations, ST Basic is no more than 25% faster than public domain Turbo-Basic or OSS's Basic XL/XE.

BETTER GRAPHICS?

How about the theories that the ST's can run larger programs? True, but can you imagine the limitations of a 1 meg XE? It could be done. Then there is the one about the ST's capability to display better graphics. False. Everyone thought that the demo's that were displayed on the ST's public debut, were, to say the least, fantastic. These demo's encouraged some 6502 programmers to show the Atari community that the 8-bit computers can produce graphic displays that match the quality of the ST's. Evidence of this is found on PAGE 6 Library Disk #42 – Special Demos, which contains exact replicas of the ST demo's – one is even an improved version! Also on the graphics topic, we can't forget the fanatics who are looking for the 'ultimate' games machine. To them, I have only one thing to say: I have yet to see an ST game that can satisfy me as much as level 63 on Rescue on Fractalus! Sound played a minor role in my decision. The ST's supposedly 'lousy' sound chip does match POKEY, and having heard digitised music on both machines I decided to ignore this factor!

These points don't mean that everyone should rush out and purchase an 8-bit system. I am simply doubting whether people can benefit from the, as yet, unrealised capabilities of the ST. And even when that full potential becomes reality, how many



Not necessary?

users will need more power than can be obtained from an XE? Business, scientific, technical users, etc., will need the extra speed and power, but can you justify the extra expense if all you do is write a couple of letters each month and keep track of your personal finances. With 512/1024K are you writing a letter or your biography?

HOW EASY TO PROGRAM?

Down to the nitty-gritty from the would be programmers point of view. How easy is to program the computers? Atari BASIC is straightforward, switch on and its there, but with ST BASIC you have to learn (or should that be master?) the GEM environment, to load and use BASIC to the full. Do you need multiple pop down menus to write a program? What about actually writing programs? Without graphics, programs can be written with relative ease on both machines. With simple graphics, it's the same case, a snip on both computers. Moving sprites? The beginner would find it slightly difficult on the 8-bit, but then again, it's nearly impossible on the ST. Somehow the XL/XE won this round.

WHAT PRICE SOFTWARE?

Software was a hard battle. Do I fork out in excess of £25 for an ST title from my local W.H. Smiths or do I gamble a £10 cheque with the Post Office, for a mail order 8-bit title because W.H. Smiths don't think it would sell if they did stock it. Thought was also given to the price I would have to pay for a blank disk and disk boxes, but with 'disk wars' continuing between the big distributors, I am keeping an open mind on this item.

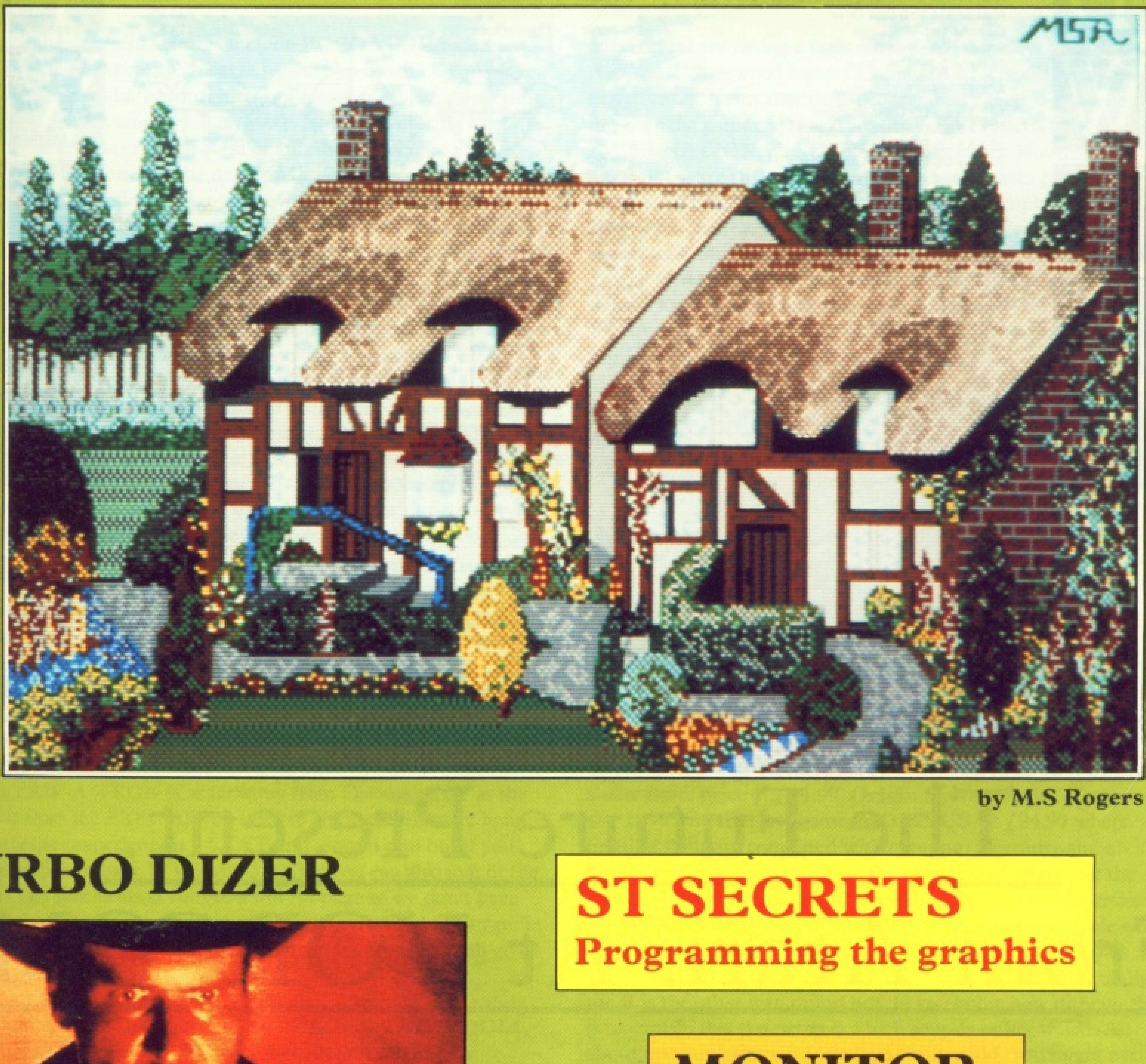
THE FINAL DECISION

Anyway my final decision? To stick with my faithful 800 XL. For now an 8-bit system is more than adequate. I may change in years to come when the ST is more firmly established and the majority of the 'fast buck' dealers have gone, but at this moment in time, I for one do not need in excess of 512K to write a letter or keep track of my cheque book. An interesting foot-note is whether I have touched an open nerve in the ST camp? Will they sit back and sulk, knowing I'm right, or will they write in trying to add more controversy? We shall have to wait and see ....

March/April 1988

STAGE

The PAGE 6 ST section



by M.S Rogers

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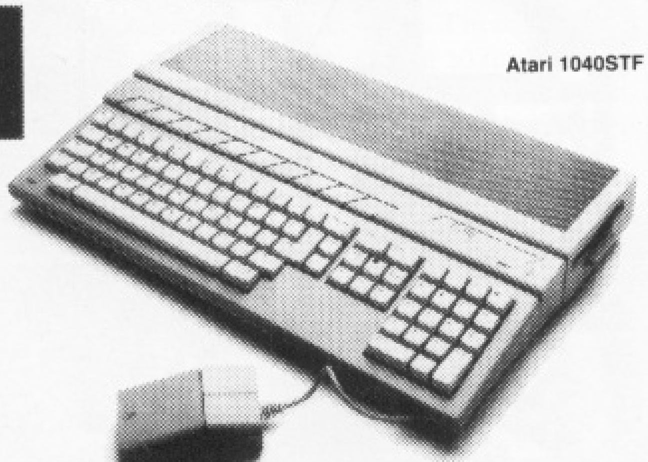
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Mirrorsoft has recently signed an agreement with Cinemaware Corporation to distribute the next six titles in the Cinemaware 'interactive fiction' line. The first four titles from Cinemaware are also distributed by Mirrorsoft and include the best-selling DEFENDER OF THE CROWN as well as SDI, THE KING OF CHICAGO AND SINBAD AND THE THRONE OF THE FALCON. New titles to be released under the agreement include **THE THREE STOOGES**, a comedy classic with arcade action and a laugh-a-minute storyline, and **ROCKET RANGER** based on an American TV serial to bring action, romance, thrills and spills to your computer. Cinemaware claim "there is nothing quite like it, graphically or artistically, in the industry today".

Activision's recent releases include **PREDATOR** based on the successful Arnold Schwarzeneggar film in which you play the part of the film's hero, alone in a treacherous jungle needing every ounce of cunning to stay alive. Although starting out with plenty of firepower in the form of automatic machine guns, grenade launchers and the deadly Mini-gun, you have to survive at the end with just your own physical strength and lightning reactions. Activision claim 'state of the art graphics, dual speed sideways scrolling and endless screens of pure arcade action'. You can see for yourself for £19.95!

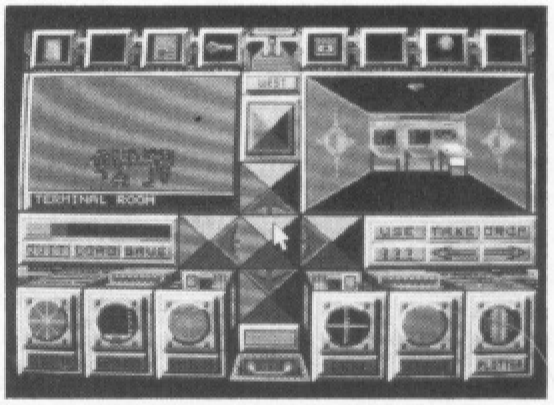
Atari has finally got its **Desktop Publishing** act together, after months of speculation, by choosing Mirrossoft's Fleet Street Publisher as the software for its Desktop Publishing system. The system, now available from Atari dealers includes a Mega ST2 or 4, monochrome monitor, 10 or 20 Mb hard drive, Atari laser printer, Fleet Street Publisher and 1st Word. The entire system will cost between £2000 and £3000 depending on the configuration chosen and undercuts the Macintosh by a substantial amount. An Apple Laserwriter alone will cost more than the entire Atari system!

Jeff Minter of **Llamasoft** looks to have finally stopped playing with Colourspace II and got down to finishing the program which is due for imminent release under the new title **TRIP-A-TRON**. Originally intended as an upgraded version of Colourspace 1, the program has now been completely rewritten from scratch with the result that it is almost a new concept in interactive computer graphics. Jeff Minter claims that TRIP-A-TRON is as far away from Colourspace 1 as the ST is from the ZX81! All you need to enjoy the ultimate light synthesiser experience is a 520ST and around £40 but if you just happen to have FIVE MEGA ST's you can also join in the fun! The specification runs to a full A4 page so we don't have enough room to bring it all to you but if you would like to get in touch with Llamasoft on 07356 4478 we are sure they will give you more information.

Infocom's latest for the ST is **SHERLOCK:THE RIDDLE OF THE CROWN JEWELS** which, as you might have guessed is a detective story. Do you fancy playing Sherlock Holmes? Well, hard luck, for in this one you play Watson who has to solve the mystery of the theft of the Crown Jewels two days before the Queens Jubilee celebrations. You must pit your wits against a clever thief with only a trail of infuriating riddles left behind to aid in your search. One such riddle is why the game is called SHERLOCK ... ? If you play Watson, what is Holmes doing? Playing the fiddle? Or maybe he has just had a heavy night smoking those naughty substances that rumour has it he enjoys!

Precision Software have released the upgraded version of its successful database Superbase Personal. **SUPERBASE PROFESSIONAL** includes all of the features of its predecessor but includes full programming facilities to enable users to produce databases specifically suited to their needs. A unique forms editor is included which allows the creation of multi-page forms combining colour, lines, boxes and fields from any file for custom applications. The inbuilt Database Management Language allows even the non-programmer to create custom routines and even pull-down menus and personalised pop-up selection panels are available. SUPERBASE PROFESSIONAL retails at £249.95 and is available from your usual supplier.

Microdeal are taking a little more time nowadays with their releases. Tanglewood has set a standard which will hard to match and it seems that their programmers keep wanting to improve the games so that titles like LEATHERNECK and INTERNATIONAL SOCCER shown at last November's Atari Show are still awaited in '88. Other releases planned include **SLAYGON** which features the most sophisticated robot ever created. Slaygon has the strength of a hundred men, the armour and weapons of a small tank and the intelligence of ... you! **OMEGA RUN** is a strategy game of which nothing more is known at present and there is also **FRIGHT NIGHT**, an 'Adult Only' game based on the film. This one could frighten you off the ST forever!



Microdeal's SLAYGON

And the rest ...

System 3 have re-released **INTERNATIONAL KARATE** at a new lower price of £14.99. **Origin Systems**, via Microprose, also have a martial arts game, **MOEBIUS**, at £24.95 where fighting skills are combined with cunning, ingenuity and a knowledge of magic to achieve the objective of retrieving the 'celestial orb of harmony'. **Prospero Software** have Version 2.1 of **PROSPERO FORTRAN** for GEM now available with three superb manuals and many enhancements at £113 plus VAT. **Mirrorsoft** have a new game called **TETRIS** (actually the R is the other way round but do you know how difficult that is to explain to a typesetter?) which sounds rather weird. All about matching shapes. If you get really good, you might even get to win the competition in the pack and get sent to Russia! **Epyx** games freaks might like to enjoy one of the current bargains on the ST entitled **EPYX ON ST** - 6 disks for £29.99 containing four games, Championship Wrestling, World Games, Winter Games and Super Cycle. A new label from Ariolasoft is **MAGIC BYTES** whose first release is **PARANOIA** where you are in a world controlled completely by computer, reminiscent of Orwell's 1984. Also due is **VAMPIRES EMPIRE** a fast and furious arcade/strategy game set in the world of Count Dracula.

PROSPERO FORTRAN

Matthew Jones takes a look at the latest version of this language

Since my review in 1986 of Prospero Fortran 77, Prospero have continued to upgrade the product, and have recently released a major new version of the compiler (now called Prospero Fortran for GEM). The compiler still compiles the full ANSI standard, but now includes a number of Prospero extensions to make it even more usable (many also available in other compilers). The most significant improvement however, is that of putting the compiler into a complete programming environment – the workbench.

THE WORKBENCH

A programming session with a normal compiler is done by loading an editor, loading the file to edit, editing it, saving, exiting and loading the compiler. The compiler reads the file, compiles it, exits, then you load the linker. It reads the compiled file (the object file), links it, exits, then you load the program, test it, then go back to the beginning to edit again. Tedious, but the way everyone works. Prospero, however, now has a better way.

After loading the Workbench, you select the 'Edit .FOR file' from the menu (or Alt E), and load the source file. The editor is a Wordstar key compatible editor with a few additions and is very easy to use, being one of the best I have found so far, though rather slow to update the screen. Make your changes, and then select 'Compile and Link' from the menu. The compiler comes into play, reading the file directly from memory. Compilation progress and errors are reported in a dialog, with an erroneous source line displayed for context and an option to Continue or Abort. After compilation (which can be separate), the linker is invoked which reads the object and library files, writing the finished program to the disk. Select the menu option for 'Run', and you can test it. When complete, you simply exit your program, the workbench re-appears, and you edit the source again to start another much speeded-up cycle. As a superb bonus, Prospero include a source-level debugger called Probe, which allows you to step through your program one line at a time, each time seeing the source line, viewing and altering the variables by name – with no need to know assembly.

The whole system works very well, much better than even the best 'shell' programs like Metacomcos' MENU+. The drawback of course is that you cannot use your own editor, but the Prospero editor is quite adequate. It is still possible to edit non-Fortran files – indeed with multiple file programs it is necessary to edit a linker control file. I experimented with interfacing assembler to the Fortran, and had no problems editing the .ASM file. To make such things even easier, you can run other programs from within the workbench, so I was able to run the assembler, then link normally.

PROBLEMS

Last time I reviewed Pro-Fortran, I tried out a 16,000 line program called COPE on it, and found that because of the strict adherence to the standard, and our sloppy programming, I could not get it to compile without major changes. I tried again this time with the latest version, and due to the extensions, was able to compile everything with under ten corrections (half of which were bugs waiting to be found!). Because of the size of the source, compiling each file one by one (even using the compile from disk facility) was very slow. Some sort of batch mode (MAKE?) would be a perfect solution. Also due to the size (I think) I was unable to link it all, but GST Link managed to.

I also had problems when the compiler or linker found errors. 95% of the time all was okay, and the 'Continue' option worked, but every so often it crashed. I soon got into the habit of pressing ALT-S to save my source (but still leaving it in memory for editing) before starting to compile.

THE MANUAL

The manual is very good, and comes as three ring bound volumes in an A5 box. The first volume covers the compiler installation and use, aspects about this particular implementation, and a complete language reference. While it could give more detail in certain more technical areas, it covers everything very well, and is a good example of what a manual should be like. The main dislike is the lack of further explanation to the error messages – the manual just repeats the compilers text – very helpful!

The second and third volumes cover the GEM interface in superb detail. They are not just the simple repeat of the DRI documentation, but actually explain things, not to absolute beginner level, but enough for a technical user. Because the Fortran is available for the IBM PC, it also covers GEM version 2, and is the best reference I have seen.

CONCLUSION

Despite the tendency to crash every so often, I have found Prospero Fortran for GEM to be a very enjoyable program to work with, and very powerful as a development system with the source level debugger. If you use Fortran, this is a program worth the money and worth having. I only wish I could use the workbench with other languages too!

Prospero Fortran for GEM costs £113 plus VAT and is available for both Atari ST and MS-DOS machines.



MACRO ASSEMBLER V.11.1
Metacomco
£49.95

Reviewed by Matthew Jones

Since I first reviewed the Metacomco Macro Assembler, it has not changed drastically in its basic functionality, but overall it is now streets ahead. The first version included only an editor, the GST linker, and the assembler. In the new version, the linker has not changed at all but the editor is a GEM based editor (as discussed in my C review), and the assembler is much faster in operation. What really improves the new package, however, are the included program development tools now standard in Metacomco languages: MENU+ the GEM based 'shell' (for managing the programming cycle); MAKE the large program management and maintenance utility (a true UNIX style MAKE); DEBUG+ the symbolic link-loading debugger; and Kumas' Resource editor – for editing GEM resource files. Also included is a GEM library to link with for access to GEM functions.

The assembler is a full macro assembler, suitable for writing large stand-alone applications or for interfacing with high-level languages. In use, it is a standard 'big system' assembler, reading a source file and outputting an object file – there is no interactive mode where you edit/assemble/run in memory – but for serious programming work this is acceptable. As well as small pure 68000 programs, I have used the assembler to write special 68000 code for both the Lattice C compiler and the Prospero Fortran, and have had no problems linking.

The assembler has a full range of options, and can produce full listings and cross references. It can output object code suitable for either the GST linker or the LINK68 linker (not supplied).

The manual is three quarters of an inch thick, and covers each program supplied. The adverts describe the manual as 'with tutorials', but this does not include all parts, and sadly the assembler is one that lacks a tutorial. I have always found assembler manuals to be very unforthcoming – they may tell you everything but they are very 'concise', so if you have no idea as to WHY you would want to do something, knowing how to do it does not help. Such a tutorial may border on 68000 code, but I would have liked more information on such subjects as 'which instructions and psuedo-ops cannot be used in order to produce position-independent code rather than relocatable?'. Why can't this be included – and why not say what the difference is for those not familiar (me first!). This is not unique to Metacomco though – most (if not all) assembler manuals are like this and general books do not help because they tend to say 'refer to your manual for detail'.

If you need an assembler then the extras provided with this one (which all work with other languages too) make it a very good buy. The assembler is very suitable for professional use (despite a slightly archaic command line format) and I can certainly recommend it. •

JACKMAKE
Vogler Software
£29.95

Reviewed by Matthew Jones

A traditional 'MAKE' program is a tool for programmers of large programs to help them with the job of compilation. Basically, MAKE uses a 'makefile' to tell it about a program, and how each file of the program depends on others. After editing a number of files, MAKE looks at the makefile and then at the edited source, discovers what is out of date and re-compiles and re-links as necessary. Thus the programmer does not have to type lots of commands after editing.

JackMake is not that sort of program what it does is simply run each program in a list you prepare. While it could be used for the production of a single source file program, it is not really aimed at the programmer but is perfect for performing frequently done, and possibly complicated, command sequences. You can specify a command line to give to the program if desired. If you do a lot of switching between programs, such as between a spreadsheet and a graphing utility, you can use JackMake to do the tedious bit for you.

Preparing a new command list is very easy. First, select the menu option to clear the current list, then select 'Add a file' (also on a ctrl key), and this gives a modified file selector, which enables you to 'show' JackMake where the program resides. The program does not have to be in any particular folder or disk drive. After selection the command is shown in →

a window. This is then repeated for each program in the sequence. To add a command line, you must click on the command in the window, select a menu option, and then fill in a (quite small) line in a dialog. A nice feature is a button which says 'file selector'. Clicking this reveals the file selector and allows you to select a data file for the command line. Unfortunately, using this deletes any command entered so far, so you can only use it once per command line. I would have preferred to be automatically offered a command line for each command added. The parameters are not shown in the window, and JackMake takes no consideration of the command type when running it, not clearing the screen prior to running a TOS program.

Once the list is prepared (you can save lists for re-use), you can choose a few aspects about its use. You can specify how many times the list will be repeated, or have it repeat forever. You can also determine whether it will show you a dialog informing you of actions it is about to take. This dialog gives three options: Okay (run the program), Skip, and Stop. If you have selected to not have the dialog and also the repeat forever option, it is still possible to interrupt the sequence with a key combination as JackMake loads the next program.

The manual, laudably printed on re-cycled paper (with two page explanation), is not particularly comprehensible. Along with the confusion of calling itself a 'MAKE' utility and then not actually being a true 'MAKE', I had a struggle understanding quite what the purpose of the program was, or how to use it and was only enlightened once I ran the program itself. Fortunately, once you understand what it is trying to do, JackMake is good in use, so the manual is not too much of a hindrance – more a drawback to selling it.

Other niggles with the program include bad spelling and also non-standard dialogs. For instance, the 'Preferences' dialog does not have OKAY and Cancel buttons – you have to click on the dialog title to exit!

Overall, this program could save you a lot of time if you often run a sequence of programs repeatedly (especially from different folders), otherwise it would appear to have no particular use. ●

QUICK-LIST ST
AB Software
£4.99

Reviewed by Matthew Jones.

Some time ago I reviewed Michtrons' Super Directory program. Quick-List is another program designed to fulfill the same purpose, that of organising your disk library and allowing you to find a file easily. As Quick-List is so cheap (at only £4.99) it has to be looked at – but how does it stand up?

Quick-List does not use the whole GEM interface. It has no menus, but a third of the screen is filled with icons that are used to select the programs' functions. The icons are very detailed (in monochrome mode) and understandable and the screen has a pleasant layout generally. The program has built-in help screens (no-manual due to cost) to explain the icons if you need it – though using it causes the loss of your file data and it would be better without this problem. The colour version is quite different, using different screen layouts at certain points. Its main problem is that it does not restore the screen colours on exit, leaving the desktop in a mess.

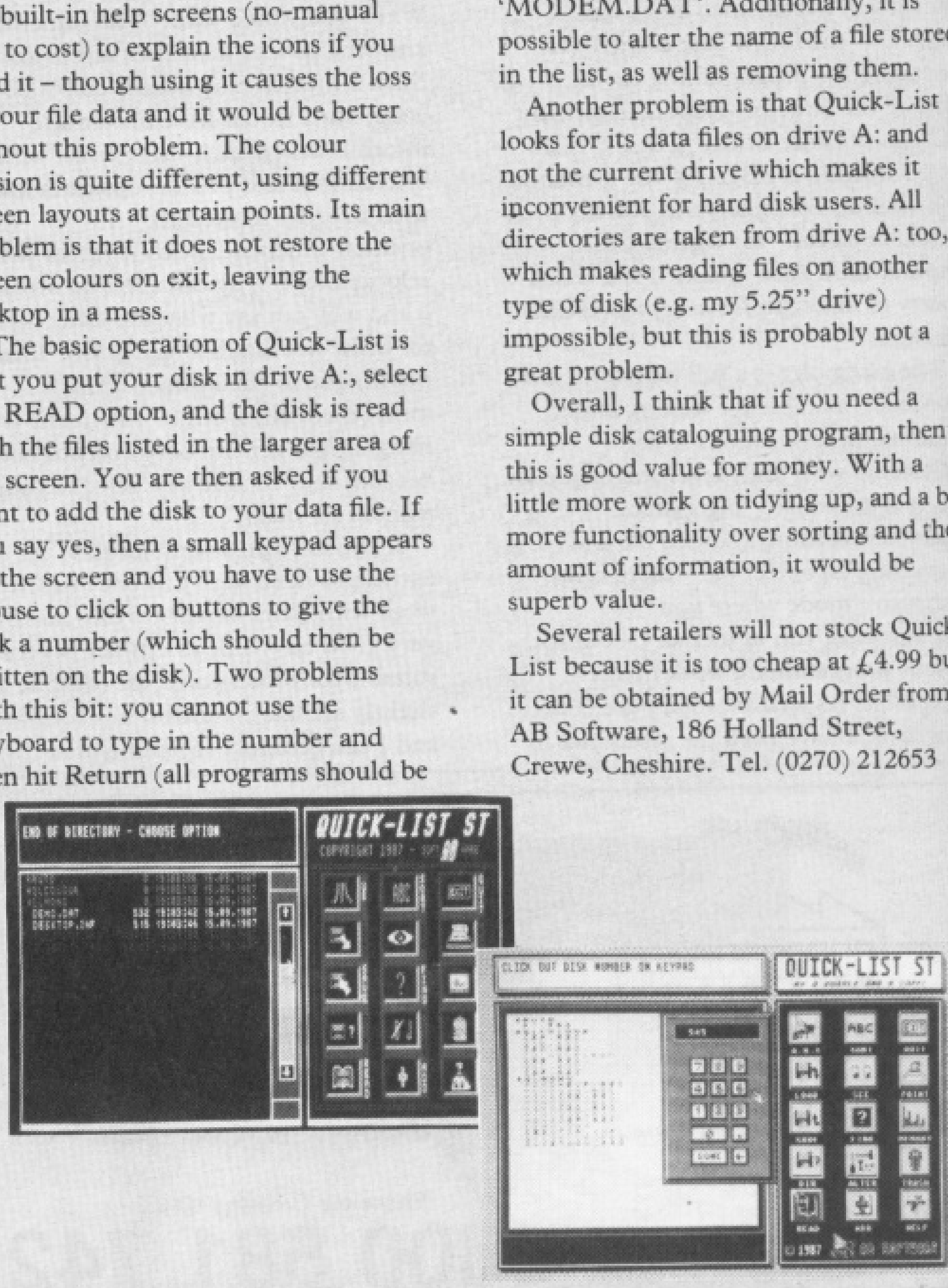
The basic operation of Quick-List is that you put your disk in drive A:, select the READ option, and the disk is read with the files listed in the larger area of the screen. You are then asked if you want to add the disk to your data file. If you say yes, then a small keypad appears on the screen and you have to use the mouse to click on buttons to give the disk a number (which should then be written on the disk). Two problems with this bit: you cannot use the keyboard to type in the number and then hit Return (all programs should be fully usable from the keyboard – not just a problem with Quick-List, my pet hate is First Word Plus but that's beside the point). The main problem however is that you do not know what disks you have already entered, and it is quite possible to give a disk number twice, thus 'doubling up' the contents.

Having entered the files (up to 1170) in this manner, you can then have the data sorted by disk number or by name, and then they can be viewed. Quick-List is not as powerful as Super-Directory in this respect, and I feel its largest drawback of all is that it does not include the path with the filenames in the printouts available. After a sort, the files become detached from their parent folders, and this would make it a little more difficult when actually finding the file on the disk. You can also find files using a search option, which is quite flexible as it looks for your keyword anywhere in the filenames, so 'DEM' would find both 'DEMO.BAS' and 'MODEM.DAT'. Additionally, it is possible to alter the name of a file stored in the list, as well as removing them.

Another problem is that Quick-List looks for its data files on drive A: and not the current drive which makes it inconvenient for hard disk users. All directories are taken from drive A: too, which makes reading files on another type of disk (e.g. my 5.25" drive) impossible, but this is probably not a great problem.

Overall, I think that if you need a simple disk cataloguing program, then this is good value for money. With a little more work on tidying up, and a bit more functionality over sorting and the amount of information, it would be superb value.

Several retailers will not stock Quick List because it is too cheap at £4.99 but it can be obtained by Mail Order from AB Software, 186 Holland Street, Crewe, Cheshire. Tel. (0270) 212653



PC DITTO

Can your ST really behave like a PC? Patrick Owen tests out Robtek's new IBM emulator which at £89.95 is a lot cheaper than buying a second computer!

PC Ditto turns your Atari ST into an IBM PC Clone. It works on the 520 or 1040 with either Colour or Mono screen and 3.5" and 5.25" diskettes as well as hard disks.

The documentation provided with it (on disk) lists over 300 pieces of PC software which have been certified as running under PC Ditto. I tested a few myself on my 520ST with a colour monitor and both Atari and Triangle drives and found nothing that would not work. Very impressive.

But ... everything I tried ran at around quarter the speed of a PC. The distributors, Robtek, claim that it runs at around 80% of a PC. I tried Lotus 1-2-3 (Version 2.01 – 3.5" version), IBM DisplayWrite Assistant (Version 1.5 – 3.5" version) and a few games – Dragonworld, Mean 18, Calixto Island, Rogue and The Leather Goddesses of Phobos under both PC DOS 3.2 and PC DOS 2.1. The text in Calixto Island and Dragonworld scrolled up quite quickly (half speed?), but whenever it had to display graphics it slowed down significantly, and the music on Dragonworld came out at less than a third of the normal speed – a very strange effect. All of my other tests (e.g. loading 200 records into 1-2-3 and sorting them, paging up and down in the word processor, and issuing multiple commands in LGoP) ran around 3 to 7 times slower under PC Ditto.

In case I had either faulty software or problems with my hardware I tried a friend's 1040ST with the same results and also got a new copy of PC Ditto from Robtek. The new copy did have about half a dozen bytes different in one program file, but had no effect at all on the response times. Robtek say they have 5,000 happy users – either I am doing something wrong, or those users don't realise how fast a PC should go – I do because I have an IBM PC sitting beside my ST!

Of course speed is not necessarily critical. If you are running a program which gives sub-second responses then under PC Ditto it may well still be fast enough to use. If you want compatibility with your office machine on a casual basis you may be more interested in the fact that it works than how fast it is.

Apart from the performance there are a few other limitations. First, it won't run IBM BASIC(A). This is a common limitation with PC Clones, caused by the fact that a large part of the BASIC is in microcode in the ROM on the PC System Board and is copyrighted by IBM. I seem to remember hearing that there were versions of BASIC around that could bypass that problem – if it is important to you then contact your local IBM Dealer. Secondly, PC Ditto will only run software configured for an IBM PC rather than a Clone. This of course raises the basic question of what exactly is compatibility!

No machine is 100% compatible. Amstrad, for instance, do not even claim compatibility – they say they can "run all the famous IBM software". IBM has a wide range of machines which are not fully compatible, e.g. a 3270-PC screen has no intensity attribute bit so you only get 8 colours in text mode instead of 16.

IBM published a set of extremely extensive Technical Reference Manuals for the PC and PC DOS. These more than anything accounted for the success of the PC. They allowed more people than ever before to produce compatible hardware and software. So what is meant by 'compatibility' is not that the machine should be 100% identical, but that it should conform to the interfaces described in the manuals.

Unfortunately technology moves on and some of the standards are now either inadequate or obsolete. IBM itself no longer sells 'PCs' – the new range is called the Personal System 2, though it is of course 'PC Compatible'. The main problem areas are threefold: the keyboard, the screen, and the disk drives.

On the keyboard side PC Ditto does very well – the Atari ST has lots of keys and only a few mappings are required, these are documented on a template. Two minor problems: the backslash, hash, tilde and broken vertical bar keys are all mixed up and there is no audio feedback, i.e. no click of any kind when you successfully depress a key.

The screen is pretty good, but here is where we find a number of undocumented limitations. Blinking, underlining and highlighting are not fully supported. In Medium Res Colour PC Ditto only supports 4 colours in text mode and in Mono High Res only 2. A PC Colour Screen has 8 plus intensity making 16. In order to see what I was outlining for Block Commands in DisplayWrite Assistant I had to get it to emulate a PC Mono Screen on my ST Colour Screen – at least it did work then!

What about disk drives? Virtually all PC software these days is provided on double-sided diskettes (both 5.25" and 3.5"). PC Ditto recommends "If you are not technically experienced and can not obtain technical assistance, we recommend that you purchase a double-sided drive. The cost of the drive will most likely be worth avoiding the technical frustrations you will encounter." I wholeheartedly endorse this. Whether you choose 5.25" or 3.5" is up to you. But without a double-sided drive no amount of technical experience will enable you to load a protected program such as Lotus 1-2-3 which only comes on double-sided diskettes!

One other area which can affect your ability to run a program under PC Ditto is the memory. My 520ST has 364K left for PC use. The documentation says a 1040 will have 703K (but PC DOS will probably limit you to 640K anyway!).

In conclusion, I would recommend that if there is some particular PC software which you want to run on your ST, you should check before buying PC Ditto that what you want will a) load on your hardware, b) not use colours or highlighting which make it unusable and c) run fast enough for your needs.

For those interested in other ways of achieving IBM PC compatibility the following may be of interest. If your PC has a 3.5" drive then, as long as you format your diskettes on the PC, you can transfer flat ASCII files between the machines with no problems (at least I have had none so far!). You will need DOS 3.2 to format the 3.5" diskettes and if your Atari ST has only a single-sided drive you will need to use a command such as DEVICE = DRIVER.SYS /D:2 /H:1 in your CONFIG.SYS to configure a single-sided drive on your PC 3.5" drive. If you want even more power and PC ability you may wish to investigate Alfa Electronics Ltd (01-390-2588) – for £239 they will provide you with their Supercharger (8086 processor, 1MB RAM, etc.) to plug into the back of your ST! •

MAILSHOT
Digita International
£24.95

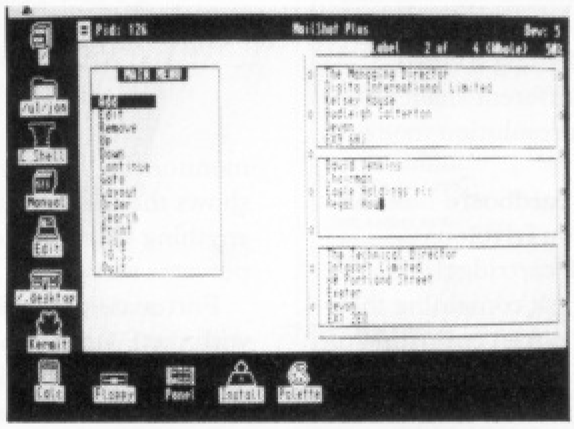
Reviewed by Les Ellingham

There have been surprisingly few programs for the ST to produce labels or mailing shots, in fact I can think of only one, LabelMaker (reviewed last issue) and that was written because there were no other programs available. Digita International have now, however, converted a popular Amstrad program over to the ST and Mailshot should be able to handle almost all your mailing requirements. It is also quite suitable as a mini database.

Mailshot does not use GEM but it does use the mouse and gives you full WYSIWYG with a unique system of scrolling labels up and down the screen. Each label is entered exactly as it would be if you were typing directly onto paper but of course with the added facilities of a computer database that allows sorting or searching of records and manipulating of labels. The program comes with a manual/tutorial but the tutorial could have been a lot better. The program is, however, quite easy to use after having glanced through the manual once or twice.

Let's assume that you have a list of names and addresses that you want to store for mailing. Just click on ADD (or use the keyboard) and type in the first label. Arrow keys can be used to move about anywhere within the label and the label is terminated by hitting RETURN on the last line. Hitting RETURN again will take you on to the next label and so you keep adding as many labels as you wish. Simple. The completed set of records can now be saved, sorted or printed. Saving the labels is straightforward and several sets of the same labels, sorted in different ways, can easily be saved.

One of the major problems with many databases is the inflexibility of sorting and you often have to plan quite carefully when setting up database fields to ensure that you can sort as required . Mailshot has a unique system of markers which make sorts infinitely flexible. If, for example, you wish to sort on a surname, many databases force you



to have a separate field for the surname or to type surname first followed by initials. With Mailshot you simply press a function key to place a marker before you type the surname and then perform a sort on this marker. Up to four markers can be used in any label so that several different sorts or levels of sort can be made. The markers can also be inserted on labels already entered so there is no problem if they are missed out as you type and, of course, you can go through a list and put the markers in another place thus allowing different types of sort. With this system it is quite possible to sort in almost any fashion you wish, a very powerful feature. Sorting is done in memory and is extremely fast.

Printing is also straightforward and flexible and you can set up labels in a number of ways. Margins can be altered and the user can choose the number of labels across as well how many of each label to print. A message can also be added to the label before it is printed. Normally the whole file is printed at one go and this is where one of the problems with the program arose. If your printer goes wrong or jams part way through a printout there does not seem to be an easy way to start printing again at a particular label. It is possible to get around this but it is not as simple as it should be.

There are several other features such as being able to add 'memo' lines to a label (which are not printed), there is automatic detection of duplicate labels and conventional searching on any line. The program caters for up to 3,000 labels per database and these can easily be broken down into 'subsets' so that different types of mailing can be performed from one set of records. This makes it possible to perform a mailing in an almost totally arbitrary fashion, which is seldom possible on conventional databases.

Mailshot is excellent value at £24.95 and will probably satisfy the labelling needs of almost every home user. An enhanced version of the program called Mailshot Plus is also available at £49.95 but the few extra features will probably not be needed by most home users. If you have a printer you almost *need* Mailshot and you will probably find untold uses for it. Because the program is called Mailshot you might think that it can only be used for long mailing lists but it can just as easily be used for labelling disks, schoolbooks, membership cards, photographs, bottles of wine, video tapes and much more. It could end up as one of the most used programs you buy! ●

TURBO DIZER

A-Magic/Software Express
£129.95

If you are looking for a way to get digitised images on your ST at a reasonable price check out the Turbo Dizer. John S Davison did and got some excellent results

Yes, it really is called the Turbo Dizer – the name doesn't give much away does it? Turbo Dizer (TD from hereon) is a high speed video digitizer for the ST, designed to capture video frames in monochrome from any standard video source (video camera, video recorder or even a television having a video output). Here, monochrome means it uses different shades of one colour, not that the image is in ST high resolution mode. In fact, it works only in low-res mode.

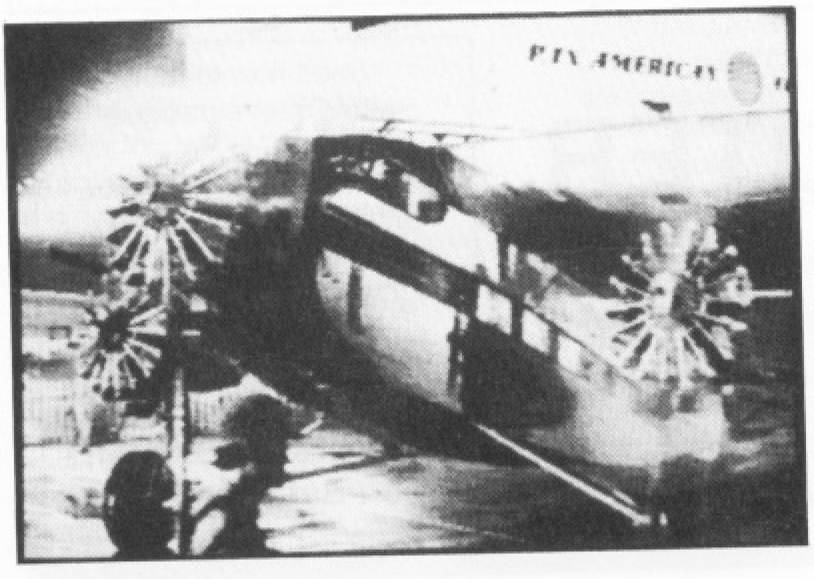
TD is supplied in a simple, foam padded cardboard box and it's obvious that money hasn't been wasted on frivolous packaging. Inside you find a rather large ST cartridge containing the frame-grabbing circuitry, a disk containing the software, and a miserable little instruction booklet consisting of just twelve pages of which only five are in English (the rest are in German).

The cartridge sits completely outside the ST's cartridge slot on four little rubber feet, the circuit board carrying the edge connector being extended about 1.5 inches clear of the cartridge case to facilitate this. The opposite end of the case carries a standard BNC bayonet connector for the video signal input.

There are no cables supplied with this unit, but suitable ones are easily obtainable from stores selling video equipment. In fact, I found I already had cables with appropriate connectors amongst the bits and bobs I've accumulated for use with my video recorder.

MONITOR MYSTERY

The ultra-skimpy manual proved to be virtually useless. It doesn't really tell you how to connect up the system, nor does it mention that the ST's monitor doesn't actually display the image you want to digitize prior to its capture! I naively assumed that the cartridge would pass the video signal straight through to the monitor screen so you could see what you were trying to capture. Not so! You need a separate means of monitoring the incoming signal. The computer monitor only shows the last frame captured, and if you haven't yet captured anything then you don't see anything. Logical, I suppose, in a perverse sort of way.



Fortunately, the Sony KV1440 combined TV/monitor I use with the ST can simultaneously take both the RGB signals from the computer (showing the captured image) and RF signals from a video recorder (showing images to be captured), with the ability to switch between them at the press of a button. If your equipment can't handle two sets of inputs then you may have to improvise some form of external switching arrangement or use a separate TV or monitor to view the incoming signal.

The disk contains English and German language versions of the program, but has no sample digitized images or utility programs often supplied with packages of this type and the program itself is rather basic – there are no facilities for manipulating captured images before saving, for loading and viewing previously captured images, or for such niceties as looking at disk directories or formatting disks. Nor is there any way of using desk accessories for these functions from within the program.

SIMPLE CONTROLS

After loading, the program takes you straight to a simple control screen. This allows you to choose the colour for your captured frame (grey, red, green or blue); to set number of shades/levels for that colour (2, 4, 8, or 16); to request use of 'stippled' patterns as well as 'solid' shades (which doubles the number of available shades); to set the format for saved files (DEGAS, Neochrome, Art Director or Bit Map) and to select Start, Help, Info, Save, or Quit. All of these are activated via mouse selected buttons, as the program doesn't use drop down menus.

By using different numbers of shades you can obtain different effects in your captured frame. This can range from the 'soot and whitewash' look produced from the two level selection right up to a reasonable 'photographic' quality from the 16 shades plus stippling setting.

Unlike the other colours, when using the grey option you're limited to a maximum of eight solid shades, as this is all the ST can handle at present. If you select sixteen grey shades the program uses only eight, but substitutes eight alternate COLOURS for the missing greys. As these are purely arbitrary, the effect produced is rather bizarre to say the least!



The program has no apparent method of changing these colours, so you're stuck with them unless you change them later using a separate art program.

The sensible selection of saved file formats means you can transfer captured images into most art programs to alter colours, clean up the image, add embellishments etc. as you wish. Also, you can use the images with just about any slideshow, desktop publishing, or other graphics utility, or even use them in your own programs.

HIGH SPEED

With everything connected up, options chosen, and the video source running, capturing an image is simplicity itself. A press of the space bar results in the video image frame currently being presented to the cartridge being grabbed, digitized, read into the ST's memory, processed for chosen colour and shades, and displayed on the ST's monitor screen. This happens quite rapidly, actual speed depending on the number of shades, varying from about an eighth of a second for two levels to about one second for 16 levels.

TD doesn't capture a complete video frame, but slices about 1.5 inches off the top, bottom, and each side of the frame (on a 14 inch monitor). This means that frames originally composed for full screen viewing are cropped, sometimes annoyingly so. If you're digitizing an image directly from a video camera you can allow for this, though. The image also suffers minor distortion as circles appear slightly oval, but this isn't a serious problem.

As well as controlling overall image appearance via number of shades, the program also allows you to alter its contrast range. Unfortunately you can't apply this to an image already captured, and have to recapture it for the adjustment to take effect. There's no indication of where the range is set at any given time, so once you move it from the default position it's difficult to reset it to neutral again.

I found capturing frames 'on the fly' from a video tape running at normal speed to be a rather hit and miss affair, with captured images often blurred beyond recognition. I found the best results were obtained using the video recorder's still-frame facility. My faithful old Toshiba Beta machine has four video heads, designed to produce still-frames without those unsightly noise bars across the picture area. It also has a variable speed frame advance facility, and I found both these features invaluable in finding good frames to digitize.

EXCELLENT RESULTS

In summary, TD works very well once you know what you're doing. I tried capturing images from several different video recordings, and produced some excellent results after a period of experimentation. I also transferred saved images to Art Director without problem. I didn't get chance to try it with a video camera, or to test compatibility with other software packages, but there's no reason to believe the results would be any different.

The package is let down by its primitive software, which provides only the most basic of functions and A-Magic should throw that awful instruction booklet in the dustbin and start again. Having said that, Turbo Dizer does bring video digitizing down to an affordable price so if you need a low cost digitizer Turbo Dizer is definitely worth looking at. •

Since the above review was written we understand from Mike Jone of Software Express that most of the criticisms of the software and manual have been attended to. Version 2 of the Turbo Dizer contains improved software that allows easier adjusting of the tones of a picture, loads pictures in any format, includes an editor for colours etc. and allows animation similar to the more expensive S.A.M. In addition, the manual is to be completely rewritten by Software Express themselves. The new version of Turbo Dizer will retail at £149.95 but existing owners can upgrade to the new software for just £5. Software Express may still have some stock at £129.95 so if you get in quick and then pay just £5 for the software upgrade you can save a few pounds!

ST SECRETS

Find out how to control the graphics on your ST. Colm Cox brings you some of the secrets of programming the ST with examples in ST BASIC, C and Assembler

This issue we will take a first look at graphics on the ST. This machine is a complex beast in the field of graphics, just look at the specification – 640 × 400 in mono (2 colours), 640 × 200 with 4 colours and 320 × 200 with 16 colours. There is also an enormous palette of 512 colours to choose from and 32K of video ram! I will split my description of graphics on the ST into two parts thus, hopefully, giving the features the ST boasts a good airing.

THE CUSTOM GRAPHICS CHIP

To start we need to take a look at the hardware registers of the custom graphic chip – 'The Shifter' – used by the ST but first we must discuss the concept of logical and physical screen bases.

The ST takes an area of 32K of ram and then converts it into a form suitable for display. The area of ram being displayed is called the 'Physical screen base' however when we give a command, for instance, to draw a line between co-ordinates 10,10 to 100,50 the ST must change screen memory for us to see the line. The area of memory that the ST alters is called the 'Logical screen base'. This can be the same as the Physical screen base but the Logical and Physical screen bases can be different, allowing us to have a picture displayed on the screen while another is drawn. When the second picture is drawn, it can be displayed instantly which opens the door to an animation technique called 'Page flipping' where a series of slightly differing pictures are drawn, held in memory and then rapidly shown one after the other giving the illusion of movement.

THE REGISTERS

The video chip's hardware registers start at address $FF8200 and continue on to $FF8260

$FF8201 - (8 bit R/W) High byte of physical screen base address.
$FF8203 - (8 bit R/W) Mid byte of physical screen base address.
The low byte of the physical screen base address cannot be changed, it always is zero, which means that the ST can only display areas of ram with starting addresses which are multiples of 256.

The next three registers are quite interesting – they provide the address of the word presently being displayed. They are read only and, as they increment at such a fast rate, are excellent random number generators.

$FF8205 - (8 bit R only) High byte of address of word currently being displayed.
$FF8207 - (8 bit R only) Mid byte of address of word currently being displayed.
$FF8209 - (8 bit R only) Low byte of address of word currently being displayed.
$FF820A - (8 bit R/W) This byte controls the synchronisation of the monitor and display chip.
Bit 1 controls the screen frequency – 0 = 60hz, 1 = 50hz (See Dave Keel's article in Page 6, Issue 23, entitled 'A Bigger Screen'). The effect of bit 1 is to enlarge the screen area on mid/low res monitors. This bit has no use with mono monitors. Bit 0 allows the syncronisation of the monitor to be either internal or external. Internal = 0 (normal setting) means that the video chip takes care of picture sync. External = 1 means that the sync pulses come from an outside source, e.g, a video camera etc. The practical effect of selecting external sync is that you get no picture! Try (from STBasic): DEF SEG=&HFF8200: POKE &HA,&HFD. To get your picture back (you'll have to type 'blind') type POKE &HA,&HFC.

```
10     REM ************************************************************************
20     REM *                          ST Secrets series                            *
30     REM *                                 by                                    *
40     REM *                              COLM COX                                 *
50     REM * --------------------------------------------------------------------- *
60     REM *              GRAPHICS part one - ARTICLE TWO - LISTING ONE            *
70     REM *                              ST Basic                                 *
80     REM *                       PAGE 6 MAGAZINE - ENGLAND                       *
90     REM ************************************************************************
100    REM
110    REM Demo of page flipping routine.  Two pages are used,  addresses:
120    REM $50000 and $78000. Text is written in both and then the two screens
130    REM can be flipped around at the press of a key.
140    REM
150    REM +----------------------------------+
160    REM !      GET SCREEN RESOLUTION       !
170    REM +----------------------------------+
175    REM
180    RESOLUTION=PEEK(&H44C)
190    IF RESOLUTION=&H000 THEN CX=160:CY=100:MR=60
200    IF RESOLUTION=&H100 THEN CX=320:CY=100:MR=60
210    IF RESOLUTION=&H200 THEN CX=320:CY=200:MR=120
220    NORMAL=PEEK(&H44E)*65536+PEEK(&H450):REM **** SCREEN BASE ADDRESS ****
230    REM +-------------------------------+
240    REM !      CLEAR BOTH SCREENS       !
250    REM +-------------------------------+
260    SCREEN=1:GOSUB SHOWSCREEN:REM *** PHYSICAL SCREEN = 1 ***
270    POKE CONTRL,3:VDISYS(1):REM ***** LOGICAL SCREEN = 2 ****
280    SCREEN=2:GOSUB SHOWSCREEN:REM *** PHYSICAL SCREEN = 2 ***
290    POKE CONTRL,3:VDISYS(1):REM ***** LOGICAL SCREEN = 1 ****
300    REM +--------------------------------------+
310    REM !      INITIALISE BOTH SCREENS         !
320    REM +--------------------------------------+
330    SCREEN=1:GOSUB SHOWSCREEN:FULLW 2:CLEARW 2:GOTOXY 0,0
340    PRINT "This is one of the two screens"
350    PRINT "It contains both text and graphics"
360    PRINT "And is displayed in an instant."
370    PRINT "Press 'A' to exit":PRINT"Anything else flips screen"
380    COLOR 1,1,1,4,2:PCIRCLE CX,CY,MR
390    REM
400    SCREEN=2:GOSUB SHOWSCREEN:FULLW 2:CLEARW 2:GOTOXY 0,0
410    PRINT "This is the other screen, and"
420    PRINT "Like the first, also contains text"
430    PRINT "And graphics.":INDEX=0
440    PRINT "Press 'A' to exit":PRINT"Anything else flips screen"
450    FOR R=MR TO 0 STEP -(MR/8)
460    COLOR 1,1,1,INDEX,2:PCIRCLE CX,CY,R:INDEX=INDEX+1:NEXT R
470    REM +---------------------------------------------------+
480    REM !    NOW SHOW THE SCREENS ONE AFTER THE OTHER       !
490    REM +---------------------------------------------------+
500    SCREEN=1:GOSUB SHOWSCREEN:I=INP(2):IF I=65 OR I=97 THEN GOTO 530
510    SCREEN=2:GOSUB SHOWSCREEN:I=INP(2):IF I=65 OR I=97 THEN GOTO 530
520    GOTO 500
530    REM +------------------------------------------------------+
540    REM !     "A" PRESSED - RESTORE EVERYTHING TO NORMAL       !
550    REM +------------------------------------------------------+
560    P=NORMAL:L=NORMAL:GOSUB 30110:END
30093 REM ************************************************************************
30094 REM * THIS ROUTINE'S FUNCTION IS TO FLIP BETWEEN THE TWO SCREENS. THE *
30095 REM * LOGICAL  SCREEN BASE IS SET TO  ONE SCREEN,  WHILE THE PHYSICAL *
30096 REM * SCREEN BASE IS SET TO POINT TO THE OTHER SCREEN. IN THIS WAY IT *
30097 REM * IS POSSIBLE TO DRAW  ON ONE SCREEN,  WHILE DISPLAYING THE OTHER *
30098 REM * AND THEN REVERSE THE SITUATION, DISPLAYING THE OTHER SCREEN.    *
30099 REM ************************************************************************
30100 SHOWSCREEN: IF SCREEN=1 THEN P=NORMAL:L=&H50000 ELSE P=&H50000:L=NORMAL
30110 PH=INT(P/65536):LH=INT(L/65536):PI=P-65536*PH:LI=L-65536*LH
30120 PM=INT(PI/256):DEF SEG=0:POKE &H44E,LH:POKE &H450,LI
30130 DEF SEG=&HFF8200:POKE 1,PH:POKE 3,PM:DEF SEG=0:RETURN
```

$FF8240 - (16 bit R/W) Colour palette register 0

$FF8242 - (16 bit R/W) Colour palette register 1

$FF8244 - (16 bit R/W) Colour palette register 2

....

$FF825A - (16 bit R/W) Colour palette register 13

$FF825C - (16 bit R/W) Colour palette register 14

$FF825E - (16 bit R/W) Colour palette register 15

Each of the colour registers take a 16 bit value which specifies the intensity of the red, green and blue parts for that colour. The form of the 16 bit word is

$XRGB

where the Hex digit X has no function and the digits R,G and B detail the intensity (0 to 7) of that particular colour. This is where we get the specification 512 colours (8 × 8 × 8).

The user with a mono monitor can try: DEF SEG=0:POKE &HFF8240,1

For users with colour monitors, a very powerful technique called colour rotation is available – see Steve Pedler's article in issue 28 for an explanation.

Certain values relating to the screen are stored in low memory by the operating system. This is similar to the idea of shadow registers on the 8 bit Atari machines where values are stored in low memory and then transferred to the hardware registers every 60th of a second. A similar situation is the case on the ST.

$44C - (16 bit R/W) Graphic resolution.

This register allows the user to switch between resolutions. It works only when switching between low and medium resolution, as switching from high to low or low to high is impossible because different monitors are required. This register also allows the programmer to determine what the current screen resolution is. The values stored in this 'register' are: $0 = Low res, $100 = Med res, $200 = High res.

$44E - (32 bit R only) Logical Screen Base address.

This 4 bit register contains the logical screen base address. I have used this in Listing 1 (STBasic). The program demonstrates the technique of page flipping. I have used only two screens but you can use as many as you wish, providing you can find sufficient memory!

```
10    REM ******************************************************************
20    REM *                        ST Secrets series                        *
30    REM *                               by                                *
40    REM *                            COLM COX                             *
50    REM * ------------------------------------------------------------- *
60    REM *         GRAPHICS part one - ARTICLE TWO - LISTING TWO           *
70    REM *                            ST Basic                             *
80    REM *                  PAGE 6 MAGAZINE - ENGLAND                      *
90    REM ******************************************************************
100   REM
110   REM This program uses the fact that numbers stored in an integer array
120   REM are stored sequentially.  The integer arrays are used to store the
130   REM Sprite Definition Block and used as the buffer for the background.
140   REM The address of the arrays are then passed to the Line A code.  You
150   REM even use this fact to store m/c programs, in an array!
160   REM
170   REM +--------------------------------+
180   REM !      INITALISE EVERYTHING      !
190   REM +--------------------------------+
200   MAX=2:DIM SPRITE%(37),BACKGROUND%(266*MAX),X(MAX),Y(MAX),XI(MAX),YI(MAX)
210   XI=3:YI=3:TOP=0:BOTTOM=383:LEFT=0:RIGHT=623:X=0:Y=0
220   LINEA=&H7FD00:INIT=0:DRAW=1:REMOVE=2
230   REM +-------------------------------------+
240   REM !      READ IN SPRITE DEFINITION      !
250   REM +-------------------------------------+
260   RESTORE 610:FOR A=0 TO 36:READ A$:SPRITE%(A)=VAL("&H"+A$):NEXT A
270   FOR A=0 TO MAX-1:X(A)=INT(RND(1)*RIGHT):Y(A)=INT(RND(1)*BOTTOM)
280   XI(A)=INT(RND(1)*14)-7:YI(A)=INT(RND(1)*14)-7:NEXT A
290   GOSUB 31000:CALL LINEA(INIT):GOSUB 690
300   REM +-----------------+
310   REM !      MAIN LOOP  !
320   REM +-----------------+
330   GOSUB DRAW.SPRITES:REM                    DRAW  <-+
340   GOSUB MOVE.SPRITES:REM                    MOVE    !
350   GOSUB ERASE.SPRITES:GOTO 330:REM         ERASE ---+
360   REM +-----------------------------------------+
370   REM !      DRAW SPRITES IN ORDER: LOW TO HIGH     !
380   REM +-----------------------------------------+
390   DRAW.SPRITES:FOR A=0 TO MAX-1
400   SPADDR=VARPTR(SPRITE%(0)):BKADDR=VARPTR(BACKGROUND%(0))
410   CALL LINEA(DRAW,X(A),Y(A),SPADDR,BKADDR+A*266)
420   NEXT A:RETURN
430   REM +------------------------------------------+
440   REM !      ERASE SPRITES IN ORDER: HIGH TO LOW     !
450   REM +------------------------------------------+
460   ERASE.SPRITES:FOR A=MAX-1 TO 0 STEP -1
470   SPADDR=VARPTR(SPRITE%(0)):BKADDR=VARPTR(BACKGROUND%(0))
480   CALL LINEA(REMOVE,BKADDR+A*266)
490   NEXT A:RETURN
500   REM +--------------------------------------------------------------+
510   REM !      MOVE EACH SPRITE ACCORDING TO ITS XI AND YI INCREMENTS      !
520   REM +--------------------------------------------------------------+
530   MOVE.SPRITES:FOR A=0 TO MAX-1:X=X(A):Y=Y(A):XI=XI(A):YI=YI(A)
540   X=X+XI:IF X<LEFT OR X>RIGHT THEN XI=-XI:X=X+XI+XI
550   Y=Y+YI:IF Y<TOP OR Y>BOTTOM THEN YI=-YI:Y=Y+YI+YI
560   X(A)=X:Y(A)=Y:XI(A)=XI:YI(A)=YI:NEXT A
570   RETURN
580   REM +--------------------------------+
590   REM !      SPRITE DEFINITION BLOCK     !
600   REM +--------------------------------+
610   DATA 0,0,0,0,1
620   DATA FFFF,FFFF,FFFF,8001,C003,8001,C003,8001
630   DATA C003,8001,C003,8001,C003,8001,C003,8001
640   DATA C003,8001,C003,8001,C003,8001,C003,8001
650   DATA C003,8001,C003,8001,FFFF,8001,FFFF,FFFF
660   REM +---------------------------------------------------------+
670   REM !      TRASH ON THE SCREEN FOR THE SPRITES TO MOVE OVER      !
680   REM +---------------------------------------------------------+
690   FULLW 2:CLEARW 2:GOTOXY 0,0
700   ?"As you can see, the sprites move in a"
710   ?"non destructive manner. Their speed is"
720   ?"slow for the simple reason that Basic"
730   ?"is slow!"
740   FOR X=0 TO 300 STEP 3:LINEF X,100,150,180:NEXT X
750   RETURN
30990 REM
30991 REM ***************************************************************
30992 REM * INSTALL CODE FOR LINE A SPRITES. CALLED BY: CALL (ARGS . .) *
30993 REM * ARG#1 - FUNCTION TO CARRY OUT:  0=INITALISE LINE A FOR USE. *
30994 REM * 1=DRAW SPRITE -> ARG#2=X POS, ARG#3=Y POS, ARG#4=ADDRESS OF *
30995 REM * S.D.B,   ARG#5=ADDRESS OF BUFFER FOR BACKGROUND.   3=ERASE  *
30996 REM * SPRITE - ARG#2=ADDRESS OF BUFFER FOR BACKGROUND. NO RANGE   *
30997 REM * CHECKING IS CARRIED OUT SO ANY OUT OF RANGE VALUES CAN AND  *
30998 REM * MOST LIKELY WILL CAUSE THE SYSTEM TO CRASH!                 *
30999 REM ***************************************************************
31000 RESTORE 31003:DEF SEG=523520:ZZZZ=0
31001 READ D:IF D<>-1 THEN POKE ZZZZ,D:ZZZZ=ZZZZ+1:GOTO 31001
31002 RETURN
31003 DATA 78,86,0,0,72,231,255,254,34
31004 DATA 110,0,10,34,17,12,129,0,0
31005 DATA 0,0,103,0,0,30,12,129,0
31006 DATA 0,0,1,103,0,0,30,12,129
31007 DATA 0,0,0,2,103,0,0,46,76
31008 DATA 223,127,255,78,94,78,117,160,0
31009 DATA 76,223,127,255,78,94,78,117,32
31010 DATA 41,0,4,34,41,0,8,32,105
31011 DATA 0,12,36,105,0,16,160,13,76
31012 DATA 223,127,255,78,94,78,117,36,105
31013 DATA 0,4,160,12,76,223,127,255,78
31014 DATA 94,78,117,192,0,0,5,95,77
31015 DATA 65,73,78,0,128,0,5,133,128
31016 DATA 0,3,229,128,0,3,69,0,0
31017 DATA  -1
```

```
; ************************************************************************
; *                        ST Secrets series                             *
; *                              by                                      *
; *                           COLM COX                                   *
; * -------------------------------------------------------------------- *
; *         GRAPHICS part one - ARTICLE TWO - LISTING THREE              *
; *                   (ASSEMBLY LANGUAGE)                                *
; *                 PAGE 6 MAGAZINE - ENGLAND                            *
; ************************************************************************

init          = $A000
draw_sprite   = $A00D
erase_sprite  = $A00C

;
; This code has to allow for the fact that  Haba  "C"  treats all arguments as
; long words.  The code given here takes account of that fact.  Also  the fact
; that   Haba  "C"  only allows the use of   D0 , D1 , A0 and A1 is taken into
; account.  If you have a  "normal" C  then use the assembly language  listing
; given in  Listing  4.  This code may work on other nonstandard  "C"'s  -  if
; Listing 4 doesn't work then try this - it may be the answer. Usage of either
; routine is exactly the same.
;

    .text                              ; Text segement.
    .global     _init_linea            ; Global so that other routines in
_init_linea                            ; link may access it.
    movem.l     #$fffe,-(sp)           ; Save registers
    .word       init                   ; Call Line-A "INIT"
    movem.l     (sp)+,#$7fff           ; Restore regs.
    rts                                ; C'est tout!

    .global     _draw_sprite           ; Global . .
_draw_sprite
    link        a6,#0                  ; Push A6 and get pointer to args.
    movem.l     #$fffe,-(sp)           ; Save regs.
    move.l      8(a6),d0               ; X co-ordinate in D0
    move.l      12(a6),d1              ; Y   ''    ''    in D1
    move.l      16(a6),a0              ; S.D.B in A0
    move.l      20(a6),a2              ; Buffer in A2
    .word       draw_sprite            ; Call Line-A "DRAW SPRITE"
    movem.l     (sp)+,#$7fff           ; Restore regs.
    unlk        a6                     ; Restore A6
    rts                                ; Bye!

    .global     _erase_sprite          ; Global . . . .
_erase_sprite
    link        a6,#0                  ; Push A6 and get pointer to arg.
    movem.l     #$fffe,-(sp)           ; Save Regs.
    move.l      8(a6),a2               ; Get buffer in A2
    .word       erase_sprite           ; Call Line-A "ERASE SPRITE"
    movem.l     (sp)+,#$7fff           ; Restore regs.
    unlk        a6                     ; Restore A6
    rts                                ; THE END.
```

```
; ************************************************************************
; *                        ST Secrets series                             *
; *                              by                                      *
; *                           COLM COX                                   *
; * -------------------------------------------------------------------- *
; *         GRAPHICS part one - ARTICLE TWO - LISTING FOUR               *
; *                   (ASSEMBLY LANGUAGE)                                *
; *                 PAGE 6 MAGAZINE - ENGLAND                            *
; ************************************************************************

init          = $A000
draw_sprite   = $A00D
erase_sprite  = $A00C

;
; This code provides the interface for the majority of "C"'s advailable for the
; ST.  This code will not work with  "HABA C"  - see Listing 3 for the required
; code.  If you are unsure as to which code to try, try this first - it is most
; likely to work - if this code doesn't work and you are sure that Listing 6 is
; correct then try Listing 3.  If this doesn't work and you are sure you've got
; no typo's - then I can be contacted at the address at the end of the article.
; But please include a S.A.E!
;

    .text                              ; Text segement.
    .global     _init_linea            ; Global so that other routines in
_init_linea                            ; link may access it.
    movem.l     d0-d7/a0-a6,-(sp)      ; Save registers
    .word       init                   ; Call Line-A "INIT"
    movem.l     (sp)+,d0-d7/a0-a6      ; Restore regs.
    rts                                ; C'est tout!

    .global     _draw_sprite           ; Global . .
_draw_sprite
    link        a6,#0                  ; Push A6 and get pointer to args.
    movem.l     d0-d7/a0-a6,-(sp)      ; Save regs.
    move.l      8(a6),d0               ; X co-ordinate in D0
    move.l      10(a6),d1              ; Y   ''    ''    in D1
    move.l      12(a6),a0              ; S.D.B in A0
    move.l      16(a6),a2              ; Buffer in A2
    .word       draw_sprite            ; Call Line-A "DRAW SPRITE"
    movem.l     (sp)+,d0-d7/a0-a6      ; Restore regs.
    unlk        a6                     ; Restore A6
    rts                                ; Bye!

    .global     _erase_sprite          ; Global . . . .
_erase_sprite
    link        a6,#0                  ; Push A6 and get pointer to arg.
    movem.l     d0-d7/a0-a6,-(sp)      ; Save Regs.
    move.l      8(a6),a2               ; Get buffer in A2
    .word       erase_sprite           ; Call Line-A "ERASE SPRITE"
    movem.l     (sp)+,d0-d7/a0-a6      ; Restore regs.
    unlk        a6                     ; Restore A6
    rts                                ; THE END.
```

DESIGNING THE SOFTWARE

That's the hardware registers but, as with most computers, the most important area is the software interface between the hardware and the user.

The ST has more than its fair share of software supporting the impressive specifications outlined at the start of this article. I aim to start at the lowest level and work up to the heights of GEM, but we must first discover how the ST stores the data it uses to represent what we see on the screen. In monochrome mode, each bit of each word represents the state of a pixel. A bit at 0 means that pixel is off, a bit at 1 means the pixel is on – see Figure 1.

In medium resolution, things become more complicated, the ST uses the screen memory in a different way to the norm. See Figure 2 for a pictorial explanation. Two contiguous words are 'joined together' – bit 0 of word 0 and bit 0 of word 1 combine to give a two bit value which is then mapped onto the appropriate colour register. In low resolution, the same applies but in this case 4 contiguous words are used – see Figure 3.

Now you know how the ST stores its screen data, but where does it store it? As I stated above, the screen can be moved in memory, however on power up the ST determines the amount of memory available and then takes 32767 from the address of the last usable byte. In a 512K system the last usable memory address is $7FFFF. $7FFFF – 32767 = $78000 therefore the 520ST places its screen at location $78000.

So, you can now access the screen directly with POKE commands. But wait! Didn't you buy the 16 bit ST because it was one of the most powerful computers available? And here you are using a POKE command to access graphics – there must be an easier way!

USING LINE A

The Line A interpreter is a feature common to all 68000 systems. When the 68000 encounters an instruction beginning with $A, such as $A000 it generates an 'exception' (I hope to discuss exceptions in a future article). The ST jumps to a section of code which interprets the meaning of that op-code. The Line A commands can be made to do whatever you wish and, on the ST, they are the ground level graphic interface.

There are 14 Line A commands, all of which take the form of:

$A00X

however for the 'C' and ST Basic programmer most of these commands duplicate some of the functions provided by the VDI interface. To save space, I will examine only those that add worthwhile extensions to the ST. Of the 14 Line A commands, only three are significantly different. These three commands are 'Initialise Line A', 'Draw Sprite' and 'Erase Sprite'.

As the Line A interface is essentially an aid to assembly language programmers, access from 'C' or ST Basic is not easy but I have included the necessary code to allow you to use these functions from your 'C' or ST Basic programs.

I will now discuss the three commands – but first, I must explain a Hot Spot! The Hot Spot is a point of reference on a sprite determined by the programmer. When the Draw Sprite command is given, the x and y co-ordinates refer to this point on the sprite. Let's take an example. Suppose the hot spot is defined by the programmer to be in the centre of a sprite. All subsequent Draw Sprite (x,y) commands will draw the sprite with the co-ordinates x,y at the sprite's centre.

THE LISTINGS

Listing 1 shows how to use multiple screens from ST Basic, Listing 2 contains a basic loader which allows the user to access Line A Sprite functions from ST Basic and also shows how this utility may be used. Listing 6 is 'C' source code which shows how to use Line A from 'C'. Listing 3 is the required binding for HABA C. Listing 4 is the binding for 'normal' C's – see my article last issue describing the need for the two listings. Finally, Listing 5 is an assembly language demonstration of how to access Line A sprites.

That's about it for this issue – next time I'll be taking a look at more features of ST graphics such as raster forms. Good luck with Line A which is a very powerful feature allowing quick and easy access to the powerful graphic features provided by the ST.

As I mentioned in the last issue, if you are having any trouble in using any of the code I have included with my articles, I can be contacted at **Colm Cox, 10 Graigue Court, Poppintree, Ballymun, Dublin 11, Eire** but please, please, please include a S.A.E!

DESCRIPTION OF LINE A COMMANDS

INITIALISE LINE A

Line A
opcode: $A000
Input: None
Description: This opcode must be executed before any other Line A opcodes are given. The function of this opcode is to initialise the areas of memory used by the Line A system. If you don't execute this opcode, none of the other opcodes function correctly – you have been warned!

DRAW SPRITE

Line A
opcode: $A00D
Input: Address of a Sprite Definition Block in A0
Address of a buffer in A2
X-Position of sprite in D0
Y-Position of sprite in D1
(A0,A2,D0,D1 are 68000 registers)
Description: This command draws a 16 × 16 pixel sprite at the screen location contained in D0 and D1. The actual definition of the sprite is held in a 'Sprite Definition Block', who's layout I have described below. The size of the block is always 74 bytes long. The buffer's size is dependant on the resolution you are working in. It's function is to retain the image under the sprite, so that when the Erase Sprite function is called, the background can be restored, thus erasing the sprite.

ERASE SPRITE

Line A
opcode: $A00C
Input: Address of buffer in A2
Description: This command restores the area under a sprite drawn with the Draw Sprite command.

BUFFER SIZES FOR DIFFERENT RESOLUTIONS:

High res 74 bytes, Medium res 138 bytes, Low res 266 bytes

SPRITE DEFINITION BLOCK

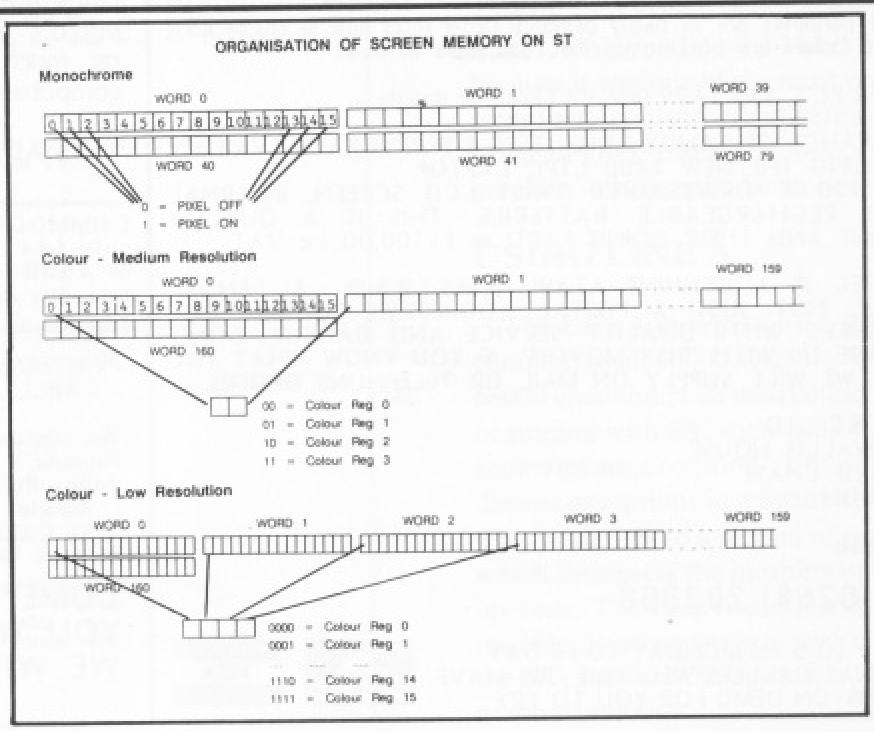
Word 0: X-Offset to Hot Spot (from top left corner)
Word 1: Y-Offset to Hot Spot (from top left corner)
Word 2: 0
Word 3: Background colour
Word 4: Foreground colour

Words 5 to **36** hold the actual definition of the sprite are held, along with a mask. The mask is an area slightly larger than the sprite within which the sprite exists. If you wish to see this effect at work, move the mouse pointer over a black area of the screen. What you are seeing is the white mask with a black arrow inside it.

Word 5: Mask line 0
Word 6: Definition line 0
Word 7: Mask line 1
Word 8: Definition line 1

......

Word 35: Mask line 15
Word 36: Definition line 15



```
; ****************************************************************************
; *                          ST Secrets series                                *
; *                                  by                                       *
; *                               COLM COX                                    *
; * ------------------------------------------------------------------------- *
; *           GRAPHICS part one - ARTICLE TWO - LISTING FIVE                  *
; *                        (ASSEMBLY LANGUAGE)                                *
; *                     PAGE 6 MAGAZINE - ENGLAND                             *
; ****************************************************************************

INIT_LINEA   = $A000                      ; Line A opcodes
DRAW_SPRITE  = $A00D
ERASE_SPRITE= $A00C
TOP          = 0                          ; Co-ordinates of screen corners
BOTTOM       = 383                        ; Adjust to suit resolution you
LEFT         = 0                          ; are working in.
RIGHT        = 623

    .TEXT                                 ; Text segement
    .GLOBAL _MAIN                         ; Program code starts here!
_MAIN
    MOVE.W  #0,X_POS                      ; Initalise x,y co-ordinates
    MOVE.W  #0,Y_POS
    MOVE.W  #2,X_INC                      ; Initalise x,y increments
    MOVE.W  #1,Y_INC
    .WORD   INIT_LINEA                    ; Initalise Line A for usage

DRAW_LOOP                                 ; Draw sprite
    MOVE.W  Y_POS,D1                      ; At X_POS,YPOS
    MOVE.W  X_POS,D0
    MOVE.L  #SPRITE_DEF,A0                ; Shape in SPRITE_DEF
    MOVE.L  #SPRITE_SAVE,A2
    .WORD   DRAW_SPRITE                   ; Using Line A opcode $A00D

    JSR     DELAY                         ; Small delay

    MOVE.W  X_POS,D0                      ; Increment x co-ordinate
    ADD.W   X_INC,D0
    MOVE.W  D0,X_POS
    CMP.W   #LEFT,D0                      ; Past left edge?
    BLT     BOUNCE_X                      ; Yes - correct it
    CMP.W   #RIGHT,X_POS                  ; Past right edge
    BGT     BOUNCE_X                      ; Yes - correct it

X_POS_OK                                  ; X co-ordinate ok
    MOVE.W  Y_POS,D0                      ; Now increment y co-ordinate
    ADD.W   Y_INC,D0
    MOVE.W  D0,Y_POS
    CMP.W   #TOP,Y_POS                    ; Past top edge?
    BLT     BOUNCE_Y                      ; Yes - correct it
    CMP.W   #BOTTOM,Y_POS                 ; Below bottom?
    BGT     BOUNCE_Y                      ; Yes - correct it

Y_POS_OK                                  ; Both x+y co-ordinates ok.
    MOVE.L  #SPRITE_SAVE,A2               ; Restore the background
    .WORD   ERASE_SPRITE
SCAN_KBD                                  ; Scan the keyboard
    MOVE.W  #$FF,-(SP)
    MOVE.W  #6,-(SP)                      ; Using GEMDOS function RAWCONIO
    TRAP    #1
    ADDQ.L  #4,SP
    CMP.L   #0,D0                         ; Any keys pressed?
    BEQ     DRAW_LOOP                     ; No then re-draw sprite

    CLR.W   -(SP)                         ; Key pressed - exit to desktop
    TRAP    #1

BOUNCE_X
    NEG.W   X_INC                         ; Let X_INC = -X_INC
    MOVE.W  X_POS,D0
    ADD.W   X_INC,D0                      ; Add 2*X_INC to X_POS
    ADD.W   X_INC,D0
    MOVE.W  D0,X_POS
    BRA     X_POS_OK                      ; Now X_POS is ok.

BOUNCE_Y
    NEG.W   Y_INC                         ; Let Y_INC = -Y_INC
    MOVE.W  Y_POS,D0
    ADD.W   Y_INC,D0                      ; Add 2*Y_INC to Y_POS
    ADD.W   Y_INC,D0
    MOVE.W  D0,Y_POS
    BRA     Y_POS_OK                      ; Now Y_POS is ok.

; ****************************************************************************
; *                        S U B R O U T I N E S                              *
; ****************************************************************************
DELAY                                     ; Short delay - adjust the length and
    MOVE.W  #5800,D0                      ; observe the effect on the sprite speed.
LOOP
    SUB.W   #1,D0
    BNE     LOOP
    RTS

    .BSS                                  ; Variable Storage Segement
X_POS       .SPACE  2                     ; All 1 word long
Y_POS       .SPACE  2
X_INC       .SPACE  2
Y_INC       .SPACE  2
SPRITE_SAVE .SPACE  266                   ; Reserve 266 bytes for background save

    .DATA                                 ; Data Storage Segement
SPRITE_DEF  .WORD   0                     ; Sprite Definition Block
            .WORD   0                     ; Alter at your own risk!
            .WORD   0
            .WORD   0
            .WORD   1

            .WORD   $FFFF,$FFFF,$FFFF,$8001,$FFFF,$8001,$FFFF,$8001
            .WORD   $F00F,$8001,$F00F,$8001,$F00F,$8001,$F00F,$8001 ; Sprite
            .WORD   $F00F,$8001,$F00F,$8001,$F00F,$8001,$F00F,$8001 ;  data
            .WORD   $FFFF,$8001,$FFFF,$8001,$FFFF,$8001,$FFFF,$FFFF

; ****************************************************************************
; *                          THAT'S ALL FOLKS                                 *
; ****************************************************************************
```

```
/****************************************************************************/
/*                          ST Secrets series                               */
/*                                  by                                      */
/*                               COLM COX                                   */
/* ------------------------------------------------------------------------ */
/*            GRAPHICS part one - ARTICLE TWO - LISTING SIX                 */
/*                                 "C"                                      */
/*                      PAGE 6 MAGAZINE - ENGLAND                           */
/****************************************************************************/

#define SPRITES 9           /* Number of sprites                               */
#define TOP 0               /* Y co-ordinates defining max + min Y value -     */
#define BOTTOM 383          /* Adjust to suit resolution you're working in     */
#define LEFT 0              /* Same for X co-ordinates                         */
#define RIGHT 623

unsigned short sprite[]={0,0,0,0,1,                                /* Sprite     */
0xFFFF,0xFFFF,0xFFFF,0x8001,0xFFFF,0x8001,0xFFFF,0x8001,     /* Definition */
0xFFFF,0x8551,0xFFFF,0x8AA1,0xFFFF,0x8551,0xFFFF,0x8AA1,     /* Block -    */
0xFFFF,0x8551,0xFFFF,0x8AA1,0xFFFF,0x8551,0xFFFF,0x8AA1,     /* alter if you */
0xFFFF,0x8001,0xFFFF,0x8001,0xFFFF,0x8001,0xFFFF,0xFFFF};    /*    wish    */

short xi[]={1,0,1,1,0,2,2,0,3};      /* X increments for the 9 sprites     */
short yi[]={1,1,0,2,2,0,1,3,0};      /* Y     ''      '   '   '   ''       */
char background[SPRITES][266];       /* Reserve memory to save backgrounds */
short x[SPRITES],y[SPRITES];         /* Co-ordinates of sprites            */
short i;

extern short init_linea(),draw_sprite(),erase_sprite();      /*   Externals  */

main()
{
    short c;

    c=0;
    init_linea();                    /* Initalise Line-A for usage - MUST DO */

    for(i=0;i<SPRITES;i++)
    {
        x[i]=i*22;  y[i]=i*16;       /* Initalise co-ordinates of sprites    */

    }

    while(c<2000)                    /* Main loop - do this 2000 times       */
    {
        c++;
        draw_sprites();              /* Draw,                                */
        move_sprites();              /* Move and                             */
        erase_sprites();             /* Erase - simple!                      */
    }
}

draw_sprites()
{
    for(i=0;i<SPRITES;i++)
        draw_sprite(x[i],y[i],sprite,&background[i][0]);
}

move_sprites()
{
    for(i=0;i<SPRITES;i++)
    {                                                               /*   Move   */
        x[i]+=xi[i];    y[i]+=yi[i];                                /*   each   */
        if(x[i]>RIGHT !! x[i]<LEFT)                                 /*  sprite  */
        {   xi[i]=-xi[i];   x[i]+=xi[i];    x[i]+=xi[i];    }       /*  inside  */
        if(y[i]>BOTTOM !! y[i]<TOP)                                 /*   the    */
        {   yi[i]=-yi[i];   y[i]+=yi[i];    y[i]+=yi[i];    }       /* screen's */
    }                                                               /* boundary */
}

erase_sprites()
{                                            /* Note: The sprites are erased in  */
    for(i=SPRITES-1;i>=0;i--)                /* reverse order - see what happens */
        erase_sprite(&background[i][0]);/* if they are erased in the same   */
}                                            /* same order as they were drawn.   */

/****************************************************************************/
/*                          THAT'S ALL FOLKS!                               */
/****************************************************************************/
```

COMPETITION WINNERS

Here are the winners of our recent competitions.

Winner of the Supra Hard Disk drive for his XL is C. Gammie of Littlehampton, West Sussex who will be enjoying all that extra power on his 8-bit by now. Runners up who received The 1ST XLENT Word Processor or XLENT ST software were P.W. Henderson of Co. Antrim, S.L. Gilbey of Benson, Oxford, A. Fitter or Birmingham, R.J. Collins from Bristol, G. Stone from Selston, Notts, P. Rixon of Shefford, Beds, R. LeBaigue from Northants, Chris Read of Milton-Keynes, Mrs Jenny Martin from Orpington and T. Wraight from Grantham.

The main prize winners in the James Bond competition were S.F. Holinshead from St. Ives, D. Black from Co. Cork, R. Tubb from Birmingham, A. Duffin from Co Louth, M. Borobin from Walsall, R. Walker from Acomb, Yorks, C. Hearn from Tring, Herts, H. Beaver from Gosprt, Hants, G. Bates from Merseyside and M. Hewson from Birmingham. Twenty others received runners up prizes.

DEFENDER OF THE CROWN

Is Mindscape's 'Interactive fiction' as good as they claim? John Sweeney checks it out

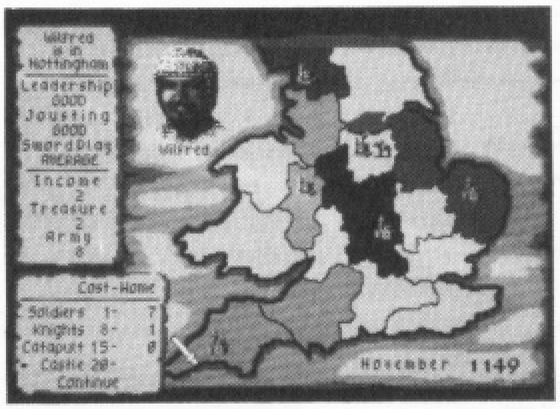
Defender of the Crown is billed as a "Cinemaware Interactive Movie". The box claims it is a "unique blend of role playing and strategy combined with dazzling arcade-style sequences". First impressions are certainly excellent. Without any doubt the graphics are superb, and as the game progresses and new pictures are displayed one is always suitably impressed by them. There is also lots of stirring music which is of a very high standard.

The main screen of the game is a map of England in 1149. This is divided into 19 territories which can provide you with income for your treasury and vassals for your army. You and two other Saxon Lords hold three of the northern territories. Three Normans hold three of the Southern territories. On each turn you may choose from a number of options, such as spending money on soldiers, knights, siege catapults or castles for newly conquered territories; holding a joust; raiding an enemy castle or attacking an adjacent territory. Further sub menus provide you with such options as examining the various territories and lords or moving men between garrisons and armies. All this is achieved with the mouse, as indeed is everything in the game (the box refers to a joystick option – but it doesn't appear to exist!).The computer resolves your moves and takes the turns for the other five Lords as you try and defeat the Norman invaders and make England safe again under your rule.

You and the other Lords each have three characteristics measured: Leadership, Swordsmanship, and Jousting Ability. These affect your chances in most stages of the game, and are in turn affected by how well you do, for example, Leadership goes down if you lose a joust, but if it is high can have a significant affect on the outcome of a battle.

As described so far the game is a fairly simplified strategic war game with the computer playing the part of games master and rolling lots of 'dice' behind the scenes, however, certain actions by either you or one of the computer players result in 'arcade style sequences'. There are four of these – Jousting, Raiding, Catapult Sieges, and Battles.

When Jousting, you must aim at your opponent's shield as he gallops towards you and press the button exactly when you hear a clang. Raiding requires you to win two sword fights during which you can move your character left or



right and thrust or parry. With Catapult Seiges your main objective is to knock down as much of the wall as possible in 7 attempts – to fire you just press the button when you think the catapult is wound down far enough. Finally, in the Battles you select options such as Defensive Hold or Outflank Enemy while soldiers stand and wave swords at each other in the middle of the screen.

Apart from various random events causing a few other pictures and messages to appear, and your ability to ask Robin Hood for help three times that's about it. Unfortunately, most of the arcade sections are, in my opinion, somewhat lacking. The only one which comes close to being an arcade game is the Raiding, but the options are too limited to make it worthwhile. Indeed, the only strategy which I or my sons had any success with at all was to hit the Thrust button as fast as possible.

Also, once you have seen the fairly limited range of pictures that make up the game, you very quickly get extremely bored with the loading time – waiting eight seconds to view a picture you have already seen and which is completely superfluous to the game is not my idea of "heart pounding action"!

The Jousting is extremely difficult (I still haven't got anywhere near mastering it), and the built in delays make it, as far as I am concerned, unplayable – you get about two seconds to aim and hit, then well over thirty seconds waiting for the next attempt while it shows you two pictures you have seen before and then has to reload the jousting scene. Even worse, if you fail you are out of that joust and have to wait for a few turns before you can call another, or if you accidentally hit the opponent's horse you are banned from jousts forever and have to restart the game if you want to practice jousts. I took the advice given in the instructions and tried to spend a game practicing jousts – on average I got two seconds practice every two minutes! What a waste of time!

Why, oh, why did they not provide either an option to turn off the pictures you have already seen or to practise jousts without interruption – or preferably both? The game is also lacking in any form of Pause or Save, or even the ability to turn the music off (no matter how good it is I don't want to hear it yet again – and I can't turn the volume down or I won't be able to hear the clang in the jousting!).

The ability to suppress the numerous pictures which it insists on loading just to accompany a two line message or a sound effect MIGHT have made the game playable, but even then I don't believe it is actually a very good game. The 'blend' of different types of game just doesn't work well. None of the components is fully satisfying in its own right but together they tend to detract from each other rather than help each other. Too much of your success in the strategical game depends on your success in the various 'arcade' bits or is affected by random events. As such it doesn't make a very good strategy game, the 'arcade' parts are too limited, and the 'role-playing' element is practically non-existent.

By all means marvel at the graphics if you get the chance, but unless you don't mind it being a little shallow, and you have lots of patience, you might want to look elsewhere for your "heart pounding action" and "heroic battles"!

Defender of the Crown is published by Mindscape and distributed by Mirrorsoft at £29.95

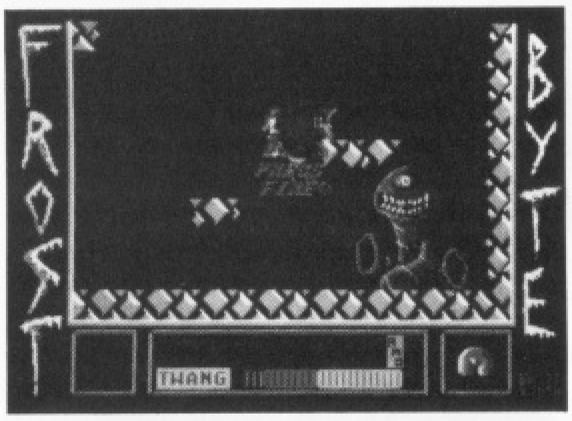
FROSTBYTE
Microvalue/Tynesoft
£14.95

Reviewed by John Davison jnr

'Deep within the caverns of the planet Cosmia a lifetime struggle for freedom is being lost. Kreezers from all over the planet are being captured by the ghoulish monsters who inhabit the planet craters'

Your job in Frostbyte is to take on the task of rescuing the captured Kreezers from their cages, which are spaced well apart from one another in the underground caverns. You were also once imprisoned, but you managed to escape, and upon leaving your cage came across a form of gun which can be used to destroy some of the 'ghouls'.

On your travels through the caverns and passages you will come across three different sorts of coloured 'sweets' which will enable your Kreezer to either move faster, jump higher, or fall further. These sweets will last indefinitely or until you pick up and use another sweet with a different effect. Also you will come across many different varieties of colourful monsters, some which will kill and some which won't, some which can be killed and some which can't.



Graphically the game is very bold and colourful, although in some places the use of dithering (dots of different colours to make darker shades etc.) has been overdone a little. The sound is quite good, and the twenty or so seconds of sampled music on the loading screen would be near enough perfect if it were not for the fact that it stops half way through a phrase. The sprites in the game, from your 'Slinky' like Kreezer to the hundreds of different ghouls, are all very colourful, and in most cases very smoothly animated. My only real complaints about the game are the difficulties which I had in getting it to load. To start with it would not load on my 1 meg drive, so I had to change the cables around to make my half meg drive Disk A. Secondly, when loading on the half meg it was rather temperamental and more often than not would 'bomb' out on first try. It usually loaded on the second or third attempt, though.

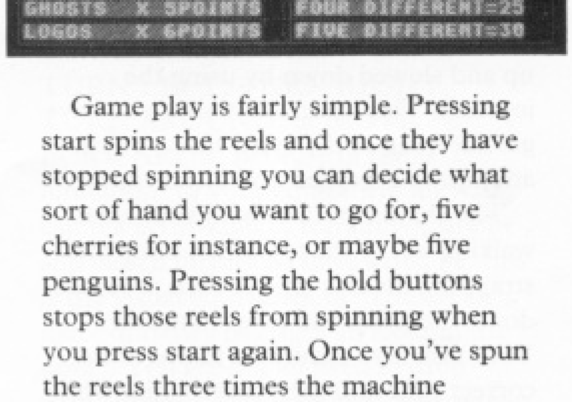
Overall 'Frostbyte' is a fairly reasonable platform type game which is priced relatively cheaply, however I did find that after playing it for a while it became a mite boring. This was because successive screens do not necessarily increase steadily in difficulty. Some are very easy and others are extremely hard. Difficult screens early on may cause loss of lives, making later screens more of a problem as you don't have spare lives to experiment with. Frostbyte should appeal to arcade adventure fans, even if it doesn't break any new ground in originality.

BANK-IT
Aaronfay Marketing
£12.95

Reviewed by Ron Stewart

When any new computer comes on the market place there quickly follows a glut of those easy to program games that usually end up in the public domain. The ST seemed to avoid this area of the software market, mainly, I think, because of the time it took the average programmer to come to terms with sixteen bit computers. Some of these games are only now appearing on the market. I must hasten to add that I don't decry these products. Many of them, like BANK-IT reviewed here, are very creditable, I only wish that the programmers had been a bit more adventurous.

BANK-IT is a mixture of fruit machine and poker game. The machine, which is totally mouse controlled, is equipped with five reels and hold and chance buttons. At the bottom of the screen are twelve poker hand selectors. You have twelve goes and each go is split into three spins of the reels. Each of the twelve poker hands is allocated a score and your aim is to amass a high score.



Game play is fairly simple. Pressing start spins the reels and once they have stopped spinning you can decide what sort of hand you want to go for, five cherries for instance, or maybe five penguins. Pressing the hold buttons stops those reels from spinning when you press start again. Once you've spun the reels three times the machine decides on how many nudges you can have. Finally when you have nudged as far as you can you select one of the hand buttons. The machine will then total your score.

The machine may give you a chance to gamble on your score. Pressing the chance button may double your score if the light stops at Yes or it could halve it if it stops at No. More points can be added if you manage to get five of a kind or if you manage to light the makers name at the top of the screen. The hands have to be chosen carefully to get the highest points total. Four cherries for example will give you twenty points whereas if you select the four together hand, you get thirty-five points. There is a high score table which will save your high scores to the game disk.

The graphics in this game are very well executed. I especially liked the LED read outs for the credits and score. The spinning reels are particularly well done. A game of this type does not give much scope for sound so don't expect anything flash. Bank-it is a good game for the younger computer user, it is easy to learn and play. Anyone else will probably tire of it pretty quickly. It is, however, one of those games that is pulled down off the shelf once in a while just to see if you can beat your last high score.

LAS VEGAS
Anco
£9.95

Reviewed by John Davison jnr

Las Vegas, as you can probably tell by the name, is a gambling game. The aim of Las Vegas is to break the bank at the casino by working through the Slot Machines, on to a game of 'Higher-or-Lower' and finally on to play Blackjack with the chance to break the bank.

The first section, the Slot Machine, resembles the screen from one of the modern gambling machines. The three reels are in the centre of the screen with the start, gamble and hold buttons below. Across the top of the screen in large letters are the words 'Las Vegas'. Each letter must be lit up before you can move onto the 'Higher-or-Lower' game. All of the buttons on the machine are pressed by positioning the mouse pointer over the button and pressing the left button.



Once you have made it to the 'Higher-or-Lower' screen, you are presented with five cards face down in the centre of the screen. Below these are four buttons, a 'deal' button, 'higher', 'lower' and finally the 'change' button which enables you to change the first card dealt. You must then guess whether the next card in the sequence is higher or lower than that just dealt. If you succeed in getting all five cards correct you can either collect your winnings and return to the Slot Machine, or gamble. If you gamble and win you are given a number of chances to reach $100 and therefore win the 'Higher-or-Lower' game. If you do actually manage to win $100 or more, you can move onto the Blackjack screen (which I have not actually managed yet!).

The Blackjack game is controlled in a similar way to the previous two sections, and if these are anything to go by, I would imagine that it is going to be pretty hard to beat the computer.

'Las Vegas', although not very original, is a reasonably fun and addictive game with some bold and brightly coloured graphics. The sound is not really that good, apart from when you collect your winnings, when the tinkle of falling coins sounds surprisingly realistic. Overall, the game is quite good and worth the asking price.

WINTER OLYMPIAD '88
Microvalue/Tynesoft
£19.95

Reviewed by Ron Stewart

Winter is upon us and we are in the middle of the skiing season. This year also happens to be Olympic year and the winter games are being held in Calgary, Canada. With this in mind, Tynesoft have released Winter Olympiad '88.

Included on the two game disks are five events. These are the downhill, ski jumping, slalom, biathlon and the two man bob. I mention five because other computers would appear to be getting six events. ST owners miss out on the speed skating. The two disks are chock a block so it would be difficult to see how they could have got another event on. You will even have to use another disk if you want to keep high scores.

On loading you can select up to six people to participate. They can each compete for a different country and the computer keeps track of the events with a medals table. You can also select to compete in all the events or any combination of the five.

The downhill is probably my favourite event of the five. The screen displays a large well animated skier from behind. On the way down the slope you will have to avoid the numerous pine trees as well as jumping logs and rocks. Getting to the bottom is no easy task and a lot of practice is required. Because the skier is directly in front of you and can obstruct your vision the view through his goggles is also shown at the bottom of the screen. A nice effect if you can handle both views at the same time, otherwise you will have to bob and weave a bit. The skier can be speeded up and slowed down by using the joystick. This means that once you have got the hang of the event then you can attempt to get faster and faster times.



The ski jump starts with your skier walking out to the top of the jump and strapping his skis on. He then proceeds down the jump and takes to the air. Your task is to ensure he jumps at the correct time and then control him while he is airborne. A good display will get you style points.

Slalom sees you winding in and out of the gates. The skier is very responsive and once again practice is required just to make it to the bottom. Control is unusual in that you can straighten the skier by pressing the joystick fire button.

The biathlon takes you through some beautiful country on you way to the firing ranges. The joystick has to be waggled left and right, but not in the wrecking fashion of other games of this type. Shooting takes a fair degree of joystick control and timing. You will have to judge the fine line as to waiting to get in a good shot or to take the time penalty if you miss.

The most disappointing event in the series is the bob sled. The start is good when the driver and brake man, with your joystick waggling assistance, run to get the bob going, but from there on things go downhill (sorry, but it had to come eventually!). The graphics are the poorest of all the events and the gameplay is not very exciting.

Winter Olympiad begs comparison with Winter Games. Of the two I would prefer the Tynesoft product. Although it has less events it is easier to play and has none of the joystick bending contortions of the older game. Graphically the Tynesoft game comes out in front as well, if only because the larger characters are a little easier to see.

If you don't possess a winter sports game and feel the need then I would suggest you go for Winter Olympiad.

TANGLEWOOD

Microdeal
£19.95

Reviewed by John Sweeney

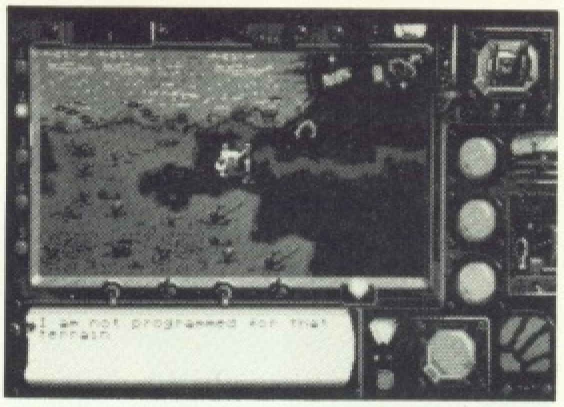
When you load Tanglewood you are presented with a control panel dotted with switches and dials surrounding a large black window which fills about three-quarters of the screen. If you use the mouse to click on one of the numbered switches on the left of the screen the window immediately fills with a colourful bird's eye view of a strange land.

The land of Tanglewood is enormous. Roads and rivers criss-cross a variety of colourful landscapes and allow you to explore around 3,000 squares of the 12,000 or so which form the grid across which your five robots, or, to be more accurate, your Mining Mobiles can travel. The roads and rivers lead to a variety of terrains such as lakes, swamps, forests and gardens – not to mention the Purple Cabbage Maze!

The variety of terrains is one of the main challenges of the game – none of the mobiles are capable of travelling on all the terrains. The limitations of your mobiles are further complicated by the fact that they are all ropy second-hand equipment, bought cheaply by your uncle who wants you to recover some vital documents for him. They are either lacking in programs or equipment, or liable to break down at a crucial moment!

It is very easy to start playing. Just pick a mobile and steer it round the roads or rivers with the mouse. You will discover lots of interesting places such as T'nglian (the local inhabitants) bases and trading posts, matter transmitters, subways, telephone boxes, and, hopefully, a few useful items. One warning here, you MUST keep the sound on when exploring new areas or you will never find anything. A ping indicates a find. If you stop where you heard the ping then the item you have found will appear in a small window near the bottom of the screen. The game is completely mouse driven. Pointing at switches on the screen, pressing mouse buttons, and moving the mouse allows you to issue the equivalent of GET, EXAMINE, USE, DROP, SAVE, RESTORE, etc. You can also access the lists of programs and data which provide each mobile with its own special abilities, e.g. Number Three could use his Anti-Gravity Data to enter the swamp, if only the Gravity Reducer hadn't been lost in a lake during an earthquake!

The graphics are so good that just exploring the main map and learning how all the mobiles work is great fun and would have provided a more than adequate adventure in its own right, but there is far, far more to Tanglewood. A number of the locations you attempt to



enter will ask you to confirm R-P transfer. Once you accept this you will find yourself in a maze. There are three quite different types of these, each providing an excellent set of puzzles to solve.

The Mines is a 'platform game'. You get a sideways view of a small area which scrolls smoothly as your mobile (visible in the centre of the screen) moves along the tunnels and up and down ladders and ropes, and presumably up and down the elevators as well if only you could get them working! The problem of mapping the mines is exacerbated by the fact that your lousy second-hand mobiles won't work properly. Number Three won't go down ladders, Number Two won't climb up ropes, and Number One has lost his mining data completely and won't even go in! Working out how to map the mines and get the three mobiles to co-operate to reach the final treasure is practically a fully-fledged arcade game in its own right!

In the Forests, Under-water, the Swamp, etc. you get a completely different view. You now see what the mobile can see ahead of itself, and you move by using an arrow to indicate TURN LEFT, TURN RIGHT, TURN AROUND, or MOVE FORWARDS. Because of the severe limitations of your equipment all you can tell is the kind of terrain you are in and which directions have exits, i.e. this is the visual equivalent of 'You are in a maze of twisty passages all looking the same'! You are not allowed to drop items to mark locations, and even worse, the MOVE FORWARDS arrow, as well as causing movement CAN also, with no indication, cause a change of the direction in which your mobile is facing as he enters a new location! Mapping some of these is a nightmare!

Somewhere deep in the Opposition Control Centre is the document you need in order to win the game. Again the view is different, now you are looking down the corridors of a three-dimensional maze. You can see walls and turnings ahead of you and also the Yellow and Red spots which mark Elevators. These mazes provide many challenges: the elevators won't all work for you and some are only one-way; the mazes are enormous – covering well over 500 locations and when you get to the highest security area, your mobile's visual scanners start malfunctioning!

Apart from the sheer problem of mapping the whole of Tanglewood, the game also has some excellent logical puzzles for you to solve, ranging from understanding the alien culture of the T'nglians to finding a way into the Walled Garden and, to add to the Arcade feel of the game, there is the problem of the enemy mobiles which zap yours, and the fact that you are racing against time. Don't be put off by that if you aren't into arcade games – you will soon discover how to avoid the enemy – and there's always SAVE/RESTORE! – and it is possible to finish the adventure in less than half the allotted time, so it is not too much of a race once you have solved all the puzzles.

As in most programs of this size there are a few minor bugs – watch out for the following rare occurrences and you should be able to avoid problems:

Apart from Stones/Crystals all other items are unique. If you find a second one of anything it's probably best to go back to your last SAVE position. (If you find a T'nglian Communications Protocol diskette deep in the mines then you should restart the game from the beginning – fortunately this appears to be extremely rare, neither I nor the writer of the program can reproduce the bug!). If the screen ever appears to be jumbled, or bits of things appear where they shouldn't be or you lose the mouse pointer, then you should reload the game and go back to your last RESTORE. You should be able to repair both holes – if your equipment vanishes after one hole then RESTORE and try again.

Tanglewood really is quite an amazing game, with tremendous scope and lots of variety. Pete Lyon's graphics are impressive, and Ian Murray-Watson's program will keep you guessing. I thoroughly enjoyed it. I'm sure you will. Let's hope for lots more of the same.

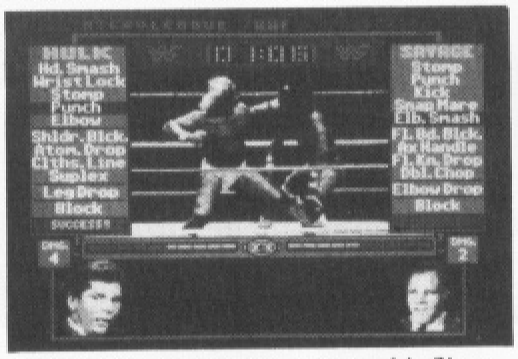
MICRO-LEAGUE WRESTLING
MLSA/Microprose
£19.95

Reviewed by Ron Stewart

The American company MicroLeague, who gave us sports fans the superb 'MicroLeague Baseball' have entered the sports market again. This time they have released 'MicroLeague Wrestling'. The Americans have a tendency to assume that if someone is a champion in their country they are a world champion. ML Wrestling is endorsed by the World Wrestling Federation and it features 'World Champion' Hulk Hogan. Believe me, this is very much an American product!

Initially you are given a choice of opponents. Hulk Hogan can wrestle either Randy 'Macho Man' Savage or Paul 'Mr. Wonderful' Orndorff. You are then treated to a ringside interview with both the wrestlers. This is conducted by a TV anchorman and each interview is supposed to come out differently, trouble is all three wrestlers make Frank Bruno look like John Geilgud!

Onto the match. The top of the screen is given over to an area which contains digitized pictures of the action. On either side of the picture are eleven possible holds or moves for each wrestler. The game play consists basically of selecting a move for your wrestler with the computer or a friend selecting the move for your opponent. The computer then decides whose move actually took place and you are then treated to a picture of the action. This gives a semi-animated appearance to the play, rather like the old fashioned flick cards or the 'What the Butler saw' machines at the sea side. Each successful



move increases your power and inflicts damage on your opponent. Both the power and damage levels are shown on the screen.

While all this is going on a ring side commentary is being kept up by two TV announcers. This, like the interview at the beginning is just text on screen stuff. Neither of them are Kent Walton and if you haven't been to the States it will not mean a lot.

Back to the bout. There are eleven moves to choose from. Five of them are considered basic, four are major and there is also a super move and a defensive block. Your wrestler obviously has a better percentage chance of making a basic move than a major move. The problem is that basic moves do not inflict much damage on your opponent. Once you have racked up a bit of damage and power then you can try your super move. Each wrestler has one of these favourite moves. If successful, and the percentages are heavily against it, you will inflict serious damage or even get a pin or knockout. Your chances of being successful in a hold can be gauged by the relative dominance meter on the screen. You can also try a bit of nastiness. If you are lagging behind and the end of the bout is in sight then cheating can be your only way to get a win. For instance, Orndorffs' manager will try to hit the Hulk over the head with his stool. Beware, because actions like this can get you disqualified.

An unusual program then. It is more of a strategy game than a joystick waggling contest. The screen display is unique. Seeing your moves enacted by the actual wrestlers is fun. The problem is that the game relies heavily on personalities and unless you know the American wrestling scene the game looses that little something. The sound does not come up to par. Applause from the crowd is just the usual static like noise. Not a sign of digital speech anywhere.

MicroLeague Wrestling would appear to have limited appeal unless you are an avid wrestling fan.

KARTING GRAND PRIX
Anco
£9.95

Reviewed by John Davison jnr

Karting Grand Prix from Anco is part of this companies 'budget' range of software, priced at just under ten pounds. The quality of this particular title is so poor that I find it difficult to think of any positive points about the game.

The loading screen is quite good, showing a picture of a few karts on a track, but this is the most impressive thing in the whole game. Once it has loaded you are presented with a menu where you can select track conditions, number of players, sprocket size, and tyre compound. You can then select which track you want to start on.

The screen then loads in and the sounds effects start. Just a long monotonous drone, which is supposed to sound like the roaring engines of the karts. The graphics are also dull and flat, being a bird's eye view of the whole track. The sprites (if you can call them that) are terrible and the animation is abysmal, being probably the worst to disgrace the ST's screen in a commercial title.

The control of these small jerky blocks is equally distressing, as it is virtually impossible to get the hang of. Left and right turns the kart and pushing forward causes the kart to accelerate. However when you stop pushing forwards to turn around a corner, the kart stops almost immediately! This stopping and starting is also painful to the eardrums as the monotonous drone only sounds when you are moving.

The various options mentioned earlier do actually have some effect on the control of your kart. The controls are so difficult to handle though that you don't notice that you accelerate faster with a larger sprocket ratio, but have a lower top speed.

At first glance you may think that 'Karting Grand Prix' is an attempt to copy the arcade game 'Super Sprint' (which incidentally has recently been released by Electric Dreams Software), however, once you have played it you will see that this game is absolutely nowhere near as playable or graphically and audibly as spectacular as Super Sprint. DO NOT be fooled by the screen shots on the back of the box if you see this in your local software store. Take a look at the game in action if you can. Games of such poor quality do the ST no justice whatsoever, but unfortunately there seem to be a great number being released.

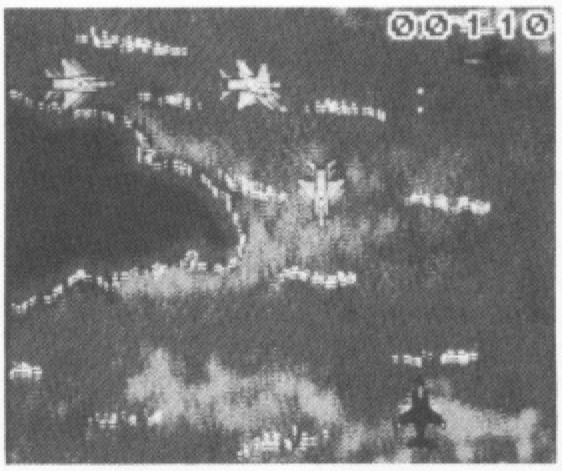
SCREAMING WINGS
Red Rat Software
£19.95

Reviewed by John Davison jnr

Screaming Wings from Red Rat is another game to be converted across to the ST from the eight bit micro's. The game is basically a vertically scrolling shoot 'em up, loosely based on the arcade machine '1942', however the ST version has been brought up to date. Instead of old World War Two planes, you now fly in a '520ST Strike Fighter', which, in the instruction booklet, looks remarkably similar to an F16 strike fighter.

The game loads with a fairly good picture of a jet fighter flying towards you with the Red Rat and the Screaming Wings logos behind it. Accompanying this picture is a digitised tune which although fairly good quality, is a little monotonous being just a bassy guitar sound repeating itself over and over.

Once the game has loaded you are shoot as many enemy planes as possible, and to pick up various features (such as shields) for your plane along the way. Shields only last for a short time, but enable you to fly anywhere without being shot out of the sky. A 'drone' plane can also be activated which flies along with you and shoots whenever you do. This particular feature is very useful



when there are a lot of enemy aircraft about. A bomb enables you to destroy all enemy fighters on the screen by hitting the space bar, and finally you can pick up a 'rapid fire' icon.

Upon completing a level you must first destroy the large enemy bomber by shooting it many times, before landing at the airfield. Having landed, another distorted voice says 'Good shooting' and greeted by a cheerful voice telling you that 'Red Rat software proudly presents...' followed by a distorted voice sounding like somebody yelling 'Screaming Wings' with a mouth full of corn flakes. Pressing the fire button on the joystick causes the game logo to disappear and the computer screams something totally unrecognisable, which no matter how many times I hear it I can't work out what it says!

The graphics in 'Screaming Wings' are clear and colourful, as are the sprites which are reasonably well animated. The background shows the sea and the islands above which the action takes place and scrolls by extremely smoothly. It's nice to see one of the cheaper British titles with scrolling that doesn't make your eyes hurt.

The aim of the game is merely to you are rewarded for the number of planes you have shot down. When you are finally killed the familiar 'Game Over' comes up on the screen, and a squeaky voice yells "Game over man,...game over!". If your score was good enough, you can put your name in the high score table, but before doing this, the guy with the corn flake problem comes back and says something unintelligible again!

Overall it's not a bad little game which is reasonably playable.

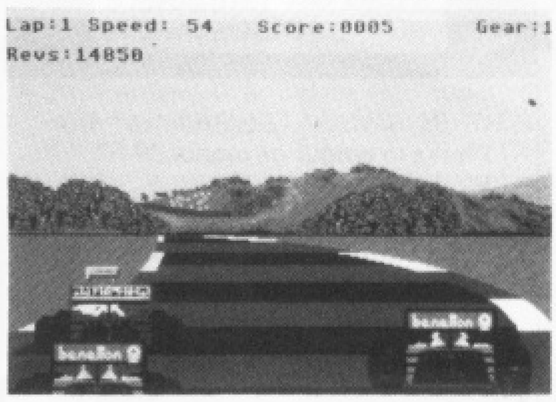
FORMULA 1 GRAND PRIX
Microvalue/Tynesoft
£19.95

Reviewed by Ron Stewart

Digitised strains of Fleetwood Mac's 'The Chain' welcome you to 'Formula 1 Grand Prix', a Pole Position clone with added frills.

After the opening titles comes the menu. Options on the screen include the choice of track, car and number of laps. You can also, if you wish, elect to run a full season using all the tracks. There are six tracks available, from the French Paul Ricard circuit with its long, fast straights to the twisty Detroit street circuit. Each circuit has different background scenery, Silverstone, though, only has very low cloud!

You are given a choice of five cars. They all have different characteristics but are all supposed to be competitive. The Williams is fast, whilst the Lotus handles well but is slow. My favourite car for best all round performance is the Benetton. The selection screen shows the cars in colourful profile. Obviously you will need to choose your car with care if you are going after lap records, it's no use trying to get the fast Ferrari around the tight Monaco streets, better here to choose the Lotus. Finally, you



can choose the number of laps you wish to race over, either one, three or five.

Using the timed practice option you can test to see which car performs well on which circuit. If your timed practice lap is within two seconds of the lap record you will get pole position in any subsequent race on that course. Racing is very similar to Pole Position. The car is moved about the track using the joystick. Pushing it forward accelerates the car, rearward decelerates. Pressing the fire button will move your car through its six (count 'em) gears. Most of the time you'll only be using fifth or sixth. Points are awarded for distance driven and the number of cars overtaken and deducted if you are overtaken. As well as the score, the engine revs, time and selected gear are shown at the top of the screen. If you are nearing the rev limit of your car the rev counter will flash, too much will blow the engine. Do this too many time or hit too many other cars and you will be disqualified for dangerous driving.

I have only one complaint and that is that the motion is shown by flashing the track. The strobing effect is quite wearing and after prolonged playing I usually ended up with a headache. I would have preferred some form of wheel movement.

As a basic racing game this one would be my choice over Pole Position. There are more complex simulations coming but Formula 1 Grand Prix is a game and not a simulation and as a game it comes out quite well.

SWITCH IT!

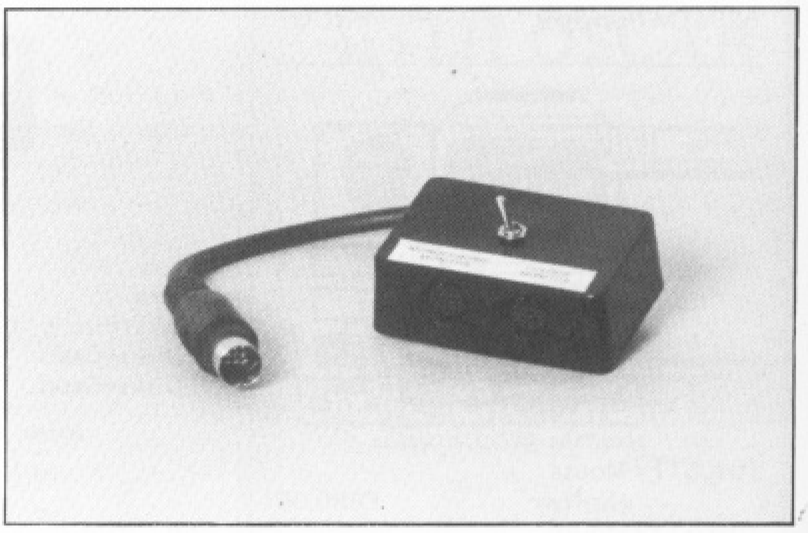
Les Ellingham checks the cost of keeping two monitors hooked up

When the ST first appeared, most users bought a mono monitor and used an existing colour monitor or also bought one of the Atari colour monitors. Other users went the other way purchasing a mono monitor later but whatever the combination there was one great bugbear which was that you had to continually unplug and plug in each monitor as required. As well as being quite tedious it hardly did the monitor socket on the ST any good.

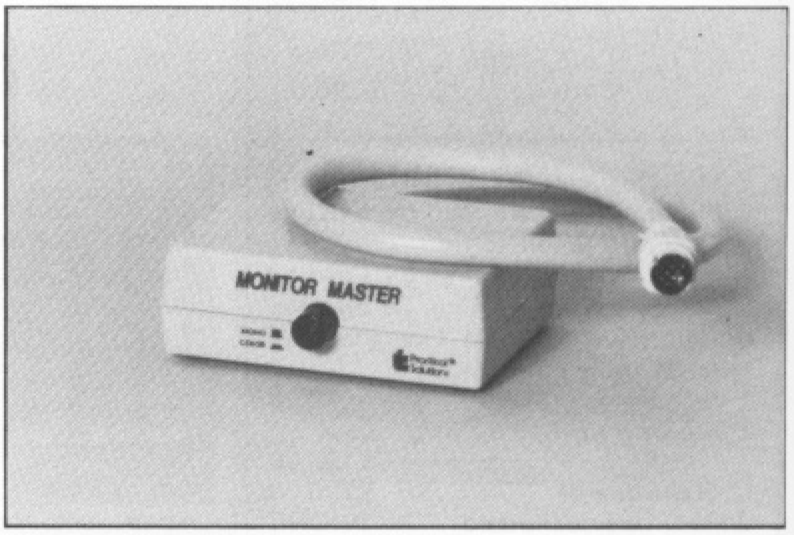
This situation continued for an unbelievably long time with only a couple of 'home made' switching devices available at high cost, but now there are several monitor switches readily available to enable you to leave both monitors hooked up and change between the two at the flick of a switch or push of a button. We have had two of these on test for a couple of months.

THE LOW COST SWITCH

The first is made by Lindy Computer and is available from Frontier Software at a cost of £19.95. It consists of a small black box 3" by 2" and 1" high which can be fairly unobtrusively tucked away behind your ST. In fact this is probably the only place for it as the cable supplied is only 8" long! The cables from your mono and colour monitors plug into the opposite side of the box to the fixed cable and a small switch mounted on top allows you to switch between monitors. Note that, as with other switches or when unplugging the monitor cable, the ST will reboot when monitors are switched.



The Lindy switch from Frontier Software



The more expensive Monitor Master

THE POSH ALTERNATIVE

If you are willing to pay out a bit more for the luxury of a monitor switch then you might like to try the Monitor Master available from Shacksoft for £35.00. This is altogether a much more sophisticated unit although it does exactly the same job as the Lindy switchbox. The box is in matching ST grey and measures 4¼" by 3" and is 1½" high. It is designed to sit either beside your ST or alongside the monitor and has a fairly generous and quite substantial cable over 2 feet long! It is also mounted on four rubber feet to protect your furniture. All cables are connected at the back of the unit and switching is achieved by a push button on the front. When pushed in the colour monitor is engaged and when pushed again the mono monitor is used. The ST will reboot as stated earlier.

A COMMON PROBLEM

Both switches work well but strangely both have the same 'bug' which means that you cannot leave your colour monitor switched on at the same time as the mono monitor. Well, you can, but both switches continue to feed a signal to the colour monitor when the mono is engaged resulting in a most annoying buzzing being emitted from the speaker of the colour monitor. I cannot understand why all lines could not be switched. Both units probably use the same switch inside and the manufacturer seems to have taken the cheap and easy way out, as is all too common nowadays.

WHICH ONE?

They both work well and either can be recommended provided that you don't mind switching off the colour monitor whilst using the mono. I personally prefer the Monitor Master because it is more flexible due to the longer cable and more stylish overall, but you may not consider that worth an extra £15.

These units can probably be obtained from your local dealer. If not Frontier Software can be contacted at P.O. Box 113, Harrogate, N. Yorks, HG2 0BE. Tel. 0423 67140 and Shacksoft are at Unit 9, Ascot Court, White Horse Business Park Trowbridge, Wilts. Tel. 02214 3502

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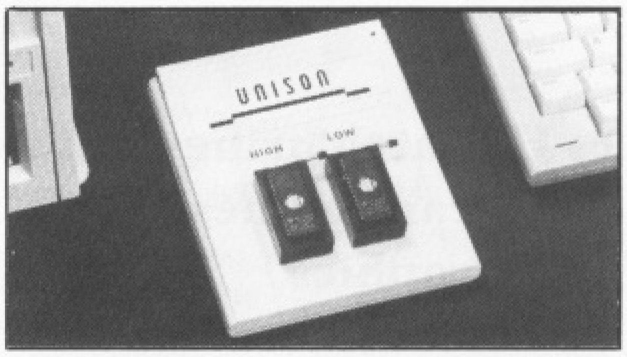
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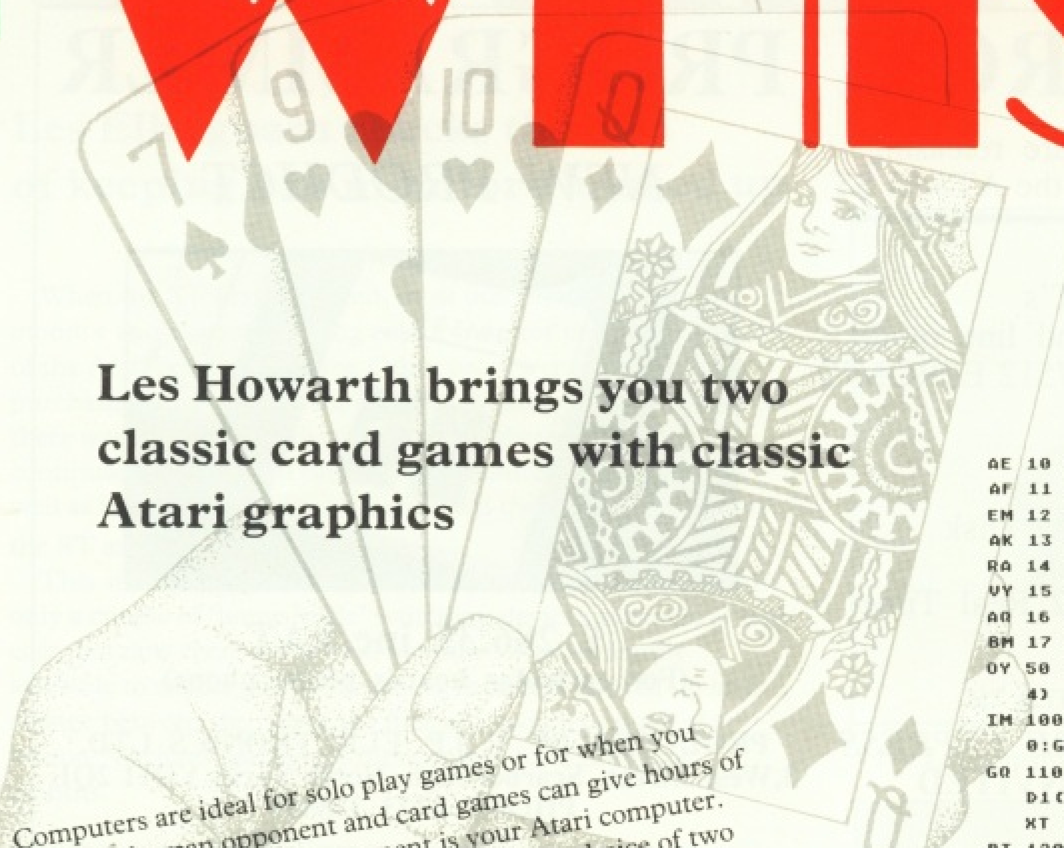
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DEALER AND OVERSEAS ENQUIRIES INVITED

WHIST



Les Howarth brings you two classic card games with classic Atari graphics

Computers are ideal for solo play games or for when you can't find a human opponent and card games can give hours of challenging play when the opponent is your Atari computer. This graphically superb program gives you the choice of two classic card games.

WALBURGE WHIST

The object of the game is to win most tricks. 13 cards are dealt to the player and to Atari. One card is placed face up on the deck and this decides the trump suit throughout that game. A random choice decides who plays first, either the player or Atari. Whatever card is lead must be followed by a card of the same suit if able. If unable to follow suit then any card or a trump can be played.

A trick is won by the highest card of the suit lead or by a trump if suit not followed. The winner of each trick takes the card which is face up into his hand. The loser takes the next card in the pack which cannot be seen, therefore the number of cards in each players hand stays at 13. The next card is turned face up but trumps remain same. Play continues until there are no cards left in the deck. The hands are then played out with no pick ups off the deck.

BLACK MARIA

This is a well known version of Whist. The game is played similar to Walburge Whist but it does not matter how many tricks you take. The object of the game is to avoid winning any hearts or the Queen of Spades. Every heart taken in tricks count one point against you and winning the Queen of Spades counts five points against you. There is no trump suit and the top cards are not shown, but the entire deck is used as in Walburge Whist with cards being picked up to replace cards used from each players hand.

```
AE 10 REM ******************************
AF 11 REM *           WHIST            *
EM 12 REM *             by             *
AK 13 REM *         LES HOWARTH        *
RA 14 REM *----------------------------*
VY 15 REM * PAGE 6 MAGAZINE - ENGLAND *
AQ 16 REM ******************************
BM 17 REM
OY 50 DIM PM$(600),B1$(40),BL$(40),PCD$(3
   4)
IM 100 GOSUB 27500:GOSUB 22000:GOSUB 1900
   0:GOTO 180
GQ 110 FOR T=N0 TO N4:FOR I=N0 TO N13:HAN
   D1(T,I)=N0:HAND2(T,I)=N0:HI(T,I)=N1:NE
   XT I:NEXT T
BI 120 FOR I=N1 TO N52:PACK(I)=I:NEXT I
SI 130 FOR I=N1 TO N52:R=INT(N52*RND(N0)+
   N1):T=PACK(I):PACK(I)=PACK(R):PACK(R)=
   T:NEXT I:RETURN
XA 180 POKE 53250,110:POSITION 17,N1:? #N
   6;"—"
GU 200 IF CD=79 THEN GOTO 6500
WL 205 IF CD=53 THEN GOSUB 6400
RF 207 IF CD>N52 THEN 226
ZG 210 POSITION 17,N2:? #N6;53-CD;:IF CD>
   43 THEN ? #N6;"/"
ZY 212 CARD=PACK(CD)
VJ 220 GOSUB 7000:T1=T:C1=CARD:B=20:B1=N0
   :IF GM$="W" THEN GOSUB 7100
HD 224 CARD=PACK(CD+N1):GOSUB 7000:T2=T:C
   2=CARD
YO 226 IF GM$="W" THEN 260
PE 230 IF FLAG THEN GOSUB 3600:GOSUB 8900
   :GOSUB 6000:GOTO 200
ME 250 GOSUB 8900:GOSUB 3000:GOSUB 6000:G
   OTO 200
WC 260 IF FLAG THEN GOSUB 900:GOSUB 8900:
   GOSUB 6000:GOTO 200
XO 300 GOSUB 8900:GOSUB 400:GOSUB 6000:GO
   TO 200
EV 400 J=N0:B3=N0:B2=N0:FOR I=N1 TO N13:G
   2=HAND2(LY,I):IF G2=N0 THEN 450
KV 405 IF J=N0 THEN B2=G2
OV 410 J=N1:IF G2>CARD1 THEN B3=G2:I=N13
UP 450 NEXT I:IF J<>N0 THEN 800
QW 460 GOSUB 2000:IF CD>N52 THEN C1=CARD1
   :GOTO 475
NI 464 IF T1=TRUMP AND LY<>TRUMP THEN 700
QN 470 IF C1>N9 THEN 700
PR 475 IF CD<53 THEN CHK(TRUMP)=N0
HB 480 GOSUB 500:GOTO 514
XC 500 F1=N0:F2=N0:G1=N0:G2=N13
MJ 502 FOR I=N1 TO N4:F=CHK(I):IF F=N0 TH
   EN 512
YR 504 IF F>G1 THEN F1=I:G1=F:GOTO 512
QU 506 IF F=G1 THEN R=INT(N2*RND(N0)):IF
   R=N1 THEN F1=I
AK 507 IF F<G2 THEN F2=I:G2=F:GOTO 512
TJ 508 IF F=G2 THEN R=INT(N2*RND(N0)):IF
   R=N1 THEN F2=I
UD 512 NEXT I:IF F2=N0 THEN F2=F1
ZM 513 RETURN
US 514 M=N0:FOR I=N1 TO N13:G2=HAND2(F2,I
   ):IF G2<>N0 THEN M=G2:I=N13
```

TYPING IT IN

DISK USERS:

1. Type in Listing 1, using TYPO 3 to check it, and SAVE the listing to disk.
2. Type in Listing 2, using TYPO 3, and SAVE it. The filenames used are not important.
3. Make sure that the disk you have saved the listings on is in Drive 1 and then RUN Listing 2. This will create a character set on your disk called GMK15.
4. To play the game RUN Listing 1 which will automatically load the character set. Listing 2 is now no longer required but the file GMK15 must always be on the same disk as Listing 1.

CASSETTE USERS:

The program was originally written for disk but we have made a number of modifications to allow cassette users to enjoy the program.

1. Type in Listing 1, using TYPO 3 to check it, but leave out lines 22005, 22010, 22020, 22030, 22040, 22050 and 22060. It is a good idea to CSAVE at this point for safety but do not delete the listing from memory.
2. *With Listing 1 still in memory*, type in Listing 2 leaving out lines 28000 and 28010.
3. Type in Listing 3, again with the main listing still in memory.
4. CSAVE the entire listing. It is a good idea to CSAVE a second copy at this point as the listing is very long.
5. To play the game just CLOAD and RUN in the normal way.

```
EI 520 NEXT I:IF CD>N52 THEN 700
WW 530 IF G2<N11 THEN F1=F2:GOTO 550
DL 535 FOR I=N1 TO N13:G2=HAND2(F1,I):IF
   G2<>N0 THEN I=N13
GD 540 NEXT I
KO 550 GOTO 1200
TC 700 F=N0:FOR I=N1 TO N13:IF HAND2(TRUM
   P,I)=N0 THEN NEXT I:GOTO 780
HO 710 G2=HAND2(TRUMP,I):I=N13:NEXT I:IF
   CD>N52 THEN R=G2:GOTO 790
YK 720 F=G2-C1:IF ABS(F)<N5 OR (ABS(F)<N8
    AND G2<N10) OR SGN(F)=-N1 THEN 770
TO 730 IF CD>N52 THEN 770
OB 760 GOTO 470
IK 770 F1=TRUMP:GOTO 1200
PG 780 IF CD>N52 THEN 530
TC 785 GOTO 475
SR 790 IF CHK(TRUMP)>N2 THEN 770
UT 793 A1=N0:FOR I=N1 TO N13:A1=A1+(HAND1
   (TRUMP,I)<>N0)
VO 794 NEXT I:IF A1=N0 OR CHK(TRUMP)>A1 T
   HEN G2=R:GOTO 770
EZ 795 IF M<>N0 THEN G2=M
SG 797 GOTO 770
DJ 800 G2=B3:IF CD<53 THEN 810
FY 810 IF T1=TRUMP AND B3>CARD1 AND ((ABS
   (B3-C1)<N6 OR ABS(B3-CARD1)<N4 OR T1>9
   )) THEN 840
GC 812 IF B3=N0 THEN G2=B2
OL 814 GOTO 840
CL 820 IF B3=N0 THEN G2=B2:GOTO 840
TG 830 IF CD<53 THEN IF (C1<N7 AND (B3-C1
   >N2 OR B3<CARD1)) AND B2<>N0 THEN G2=B
   2
SZ 840 F1=LY:GOTO 1200
RN 900 GOSUB 2100
UP 905 GOSUB 8800:G1=N0:B2=N0:L=N0:M=N0:G
   OSUB 2000
CZ 910 IF CD>N52 THEN 1400
KO 914 IF T1=TRUMP OR C1>9 THEN 1050
JC 920 G1=N1:J=N13:J1=N0:J2=N0:B3=N0:FOR
   I=N1 TO N4:IF CHK(I)=N0 OR I=TRUMP THE
   N 960
IL 940 IF CHK(I)<J THEN J1=I:J=CHK(I)
RO 950 IF CHK(I)>B3 THEN J2=I:B3=CHK(I)
GL 960 NEXT I
MY 965 FOR I=N13 TO 11 STEP -N1:G2=HAND2(
   J1,I):IF G2=N0 THEN 980
CY 967 IF ABS(G2-C1)<N2 THEN I=11:NEXT I:
   F1=J1:G1=N2:GOTO 1200
IC 970 IF CHK(J1)<N3 AND ABS(G2-C1)>N3 TH
   EN G2=N0:I=11:NEXT I:GOTO 1150
GP 980 NEXT I
SC 990 G1=N3:F=N0:B2=N0:B3=N13:F1=J1
VK 995 FOR J=N1 TO N3:FOR L=N1 TO N13:G2=
   HAND2(J1,L):IF G2=N0 THEN 1020
GL 1000 IF ABS(G2-C1)<J*N2 THEN L=N13:NEX
   T L:G1=16:GOTO 1200
XO 1020 NEXT L:NEXT J
JF 1030 G1=18:FOR J=N1 TO N2:FOR I=N1 TO
   N13:G2=HAND2(J2,I):IF G2=N0 THEN 1040
MX 1033 IF ABS(C1-G2)<J*N2 THEN F1=J2:I=N
   13:J=N2:NEXT I:NEXT J:GOTO 1200
KT 1040 NEXT I:NEXT J:GOTO 1150
VK 1050 IF (C1<N11 AND T1<>TRUMP) OR (T1=
   TRUMP AND C1<N5) THEN 1063
HM 1051 GOSUB 1220:IF F2<>N0 THEN 1200
ME 1052 G1=15:B2=N0:B3=N0:FOR J=N13 TO 12
    STEP -N1:FOR T=N1 TO N4:G2=HAND2(T,J)
   :IF G2=N0 THEN 1056
OM 1054 IF ABS(C1-G2)<N2 THEN B3=T:B2=G2:
   GOSUB 1300
EW 1055 IF (C1>N11 AND G2=N13) THEN F1=T:
   F2=G2
NA 1056 NEXT T:NEXT J:IF F2<>N0 THEN G2=F
   2:GOTO 1200
BX 1057 IF B3=N0 THEN 1063
LF 1060 G1=19:J=N0:J1=N13:FOR I=N1 TO N4:
   F=CHK(I):IF F=N0 THEN 1062
KF 1061 IF F<J1 THEN J1=F:J=I
HB 1062 NEXT I:G2=HAND2(J,J1):F1=J:GOTO 1
   200
IX 1063 G1=N5:FOR T=N1 TO N4:FOR I=N13 TO
    N10 STEP -N1:G2=HAND2(T,I):IF G2=N0 T
   HEN 1075
OK 1065 IF T1=TRUMP AND ABS(C1-G2)>N8 THE
   N G2=N0:GOTO 1075
GD 1070 IF T1<>TRUMP AND C1<10 AND G2>11
   THEN G2=N0:GOTO 1075
WC 1072 G1=N6:I=N10:F1=T:T=N4
IB 1075 NEXT I:NEXT T:IF G2<>N0 THEN G1=N
   7:GOTO 1200
NU 1080 FOR I=N13 TO N6 STEP -N1:G2=HAND2
   (TRUMP,I):IF G2=N0 THEN 1100
ZK 1090 F1=TRUMP:IF ABS(G2-C1)<N2 THEN I=
   N6
JY 1100 NEXT I:IF G2<>N0 THEN G1=9:GOTO 1
   200
HK 1150 FOR J=N1 TO N2:FOR I=N1 TO N13:G2
   =HAND2(T1,I):IF G2=N0 THEN 1157
JG 1155 IF ABS(G2-C1)=J THEN I=N13:J=N3:F
   1=T1:NEXT I:NEXT J:GOTO 1200
XW 1157 NEXT I:NEXT J
OU 1160 G1=11:F=N0:FOR J=N1 TO N5:FOR T=N
   1 TO N4:FOR M=N1 TO N13:IF M=J1 THEN 1
   190
OH 1170 G2=HAND2(T,M):IF G2=N0 THEN 1190
SF 1175 IF ABS(G2-C1)<N2*J THEN M=N13:F1=
   T:T=N4:J=N5:F=N0:GOTO 1190
UF 1176 F=G2
NS 1190 NEXT M:NEXT T:NEXT J:IF F<>N0 THE
   N G2=F
AW 1200 IF HAND2(F1,G2)=N0 THEN 1215
DP 1210 BEST=G2:B=29:B1=N0:CARD=G2:HAND2(
   F1,G2)=N0:T=F1:GOSUB 7100:RETURN
OL 1215 FOR I=N1 TO N4:IF HAND2(I,G2)=N0
   THEN 1218
KE 1216 F1=I:I=N4:NEXT I:GOTO 1210
GK 1218 NEXT I:STOP
QL 1220 F2=N0:FOR T=N1 TO N4:FOR I=N13 TO
    N1 STEP -N1:G2=HI(T,I):IF G2=N0 THEN
   1250
FI 1230 G2=HAND2(T,I):IF G2<>N0 THEN F1=T
   :I=N1:T=N4:F2=G2:GOTO 1250
VN 1240 I=N1
TY 1250 NEXT I:NEXT T:RETURN
SH 1300 F=B2:FOR I=N1 TO N4:CHK(I)=N0:NEX
   T I
HT 1310 IF HAND2(B3,F)<>N0 THEN CHK(B3)=F
   :F=F-N1:GOTO 1310
AL 1320 RETURN
BY 1400 GOSUB 1220:IF F2<>N0 THEN G2=F2:G
   OTO 1200
IH 1405 IF K=N0 THEN 1460
PY 1410 IF K=TRUMP AND CHK(K)<N3 AND CD<7
   1 THEN 1500
DW 1420 FOR I=N1 TO N13:G2=HAND2(K,I):IF
   G2=N0 THEN 1430
QF 1425 F1=K:I=N13
RG 1430 NEXT I:IF G2<>N0 THEN 1200
KB 1460 J=N0:J1=N0:J2=N0:F2=N13:FOR I=N1
   TO N4:F=CHK(I):IF F=N0 THEN 1480
GB 1470 IF F>J THEN J1=I:J=F
LN 1475 IF F<F2 THEN F2=F:J2=I:IF J2=J1 T
   HEN F2=N13
FV 1480 NEXT I
TR 1500 FOR I=N13 TO N1 STEP -N1
EX 1510 G2=HAND2(J1,I):IF G2=N0 THEN 1540
MR 1520 I=N1:F1=J1
RL 1540 NEXT I:IF G2<>N0 THEN 1200
QO 1570 FOR I=N13 TO N1 STEP -N1:G2=HAND2
   (TRUMP,I):IF G2=N0 THEN 1590
AA 1580 F1=TRUMP:I=N1
SA 1590 NEXT I:IF G2<>N0 THEN 1200
OX 1600 STOP
NP 2000 FOR I=N1 TO N4:CHK(I)=N0:NEXT I
VJ 2010 FOR T=N1 TO N4:FOR I=N1 TO N13
FN 2020 IF HAND2(T,I)=N0 THEN 2050
JC 2030 CHK(T)=CHK(T)+N1
TV 2050 NEXT I:NEXT T:RETURN
JC 2100 POKE 88,28:POKE 89,136:POSITION N
   0,N0:? #N6;"  my lead  ":POKE 88,N0:PO
   SITION N1,N0:? #N6;"           "
JX 2110 GOSUB 8800:RETURN
OU 3000 J=N0:B3=N0:B2=N0:F1=LY:G1=N0
GY 3010 FOR I=N1 TO N13:G2=HAND2(LY,I):IF
    G2=N0 THEN 3050
NN 3020 J=N1:IF G2<CARD1 THEN B3=G2
OE 3030 IF LY=N4 AND G2=N11 THEN G1=G2:GO
   TO 3050
MM 3040 B2=G2
HJ 3050 NEXT I:IF J=N1 THEN 3500
MV 3100 G2=HAND2(N4,N11):IF G2<>N0 THEN F
   1=N4:GOTO 1200
```

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WT 3110 F1=N1:B3=N0:FOR I=N13 TO N1 STEP
   -N1:G2=HAND2(N1,I):IF G2=N0 THEN 3150
PP 3120 B3=G2:I=N1
TH 3150 NEXT I:IF B3<>N0 THEN 3400
PT 3170 GOSUB 2000:GOSUB 500:J1=F1:J=N0
KR 3180 B2=N0:T=N6:IF CD>N52 THEN GOSUB 4
   800:GOTO 3470
YF 3185 FOR I=N7+T TO T STEP -N1:G2=HAND2
   (F2,I):IF G2=N0 THEN 3200
JM 3190 F1=F2:I=N1:B2=G2
NT 3200 NEXT I:IF B2<>N0 THEN 1200
CY 3210 B3=N0:FOR I=N7+T TO T STEP -N1:G2
   =HAND2(J1,I):IF G2=N0 THEN 3230
KL 3220 F1=J1:I=N1:B3=G2
FE 3230 NEXT I
FP 3240 FOR I=N2 TO N4:IF I=J1 OR I=F2 TH
   EN 3250
WS 3245 J2=I
FK 3250 NEXT I
AX 3280 G1=N0:FOR I=N7+T TO T STEP -N1:G2
   =HAND2(J2,I):IF G2=N0 THEN 3300
MS 3290 I=N1:G1=G2
EX 3300 NEXT I
VT 3320 IF B3>G1 THEN F1=J1:G2=B3:GOTO 12
   00
ZS 3330 IF G1>B3 THEN F1=J2:G2=G1:GOTO 12
   00
DL 3350 IF T=N6 THEN T=N1:GOTO 3185
JV 3360 IF B3=G1 THEN T=INT(2*RND(N0)+N1)
   :IF T=N1 THEN F1=J1:G2=B3:GOTO 1200
IZ 3370 F1=J2:G2=G1:GOTO 1200
RA 3400 IF HI(N4,N11)=N0 THEN 3460
UA 3410 F2=N0:FOR L=N13 TO N12 STEP -N1:G
   2=HAND2(N4,L):IF G2=N0 THEN 3450
OE 3420 F2=N1:L=N11:F1=N4
VI 3450 NEXT L:IF F2<>N0 AND (CHK(N4)<N2)
    THEN 1200
KD 3460 G2=B3:F1=N1:GOTO 1200
KK 3470 A=N2:G1=N0:J=N0:FOR T=N2 TO N4:IF
    SS(T)=N0 OR CHK(T)=N0 THEN 3477
DD 3472 FOR I=N13 TO N1 STEP -N1:G2=HAND2
   (T,I):IF G2=N0 THEN 3475
OT 3473 IF G2>J THEN J=G2:G1=T:IF CHK(T)=
   N1 THEN T=N4:I=N13
GO 3475 NEXT I
ZZ 3477 NEXT T:IF G1<>N0 THEN G2=J:F1=G1:
   GOTO 1200
ZT 3480 A=N4:FOR T=N2 TO N4:IF CHK(T)=N0
   THEN 3490
KJ 3482 FOR I=N13 TO N1 STEP -N1:G2=HAND2
   (T,I):IF G2=N0 THEN 3487
XA 3485 F1=T:T=N4:I=N1
GZ 3487 NEXT I
PQ 3490 NEXT T:GOTO 1200
OR 3500 F1=LY:IF LY<>N1 AND LY<>N4 THEN 3
   560
WU 3505 IF LY=N4 THEN 3540
DG 3510 IF B3<>N0 THEN G2=B3:GOTO 1200
TK 3520 GOTO 3560
BF 3540 IF CARD1=11 AND B3<>N0 THEN G2=B3
   :GOTO 1200
CJ 3550 IF B2<>N0 THEN G2=B2:GOTO 1200
DV 3560 IF B3<>N0 THEN G2=B3:GOTO 1200
DG 3565 IF B2<>N0 THEN G2=B2:GOTO 1200
VY 3570 G2=G1:GOTO 1200
FB 3600 A=N0:GOSUB 2100:GOSUB 2000:GOSUB
   500:J1=F1
DQ 3607 IF CD>N52 THEN 5000
TA 3608 IF F2<>N4 OR K=N4 THEN 3650
SJ 3610 IF HI(N4,N11)=N0 THEN 3650
LY 3620 J=N0:FOR I=N13 TO N11 STEP -N1:G2
   =HAND2(N4,I):IF G2=N0 THEN 3640
IJ 3630 J=I:I=N11
EB 3640 NEXT I:IF HAND2(N4,N11)=N1 THEN J
   =N0:A=N7:GOTO 3750
GM 3641 A=N2:IF CHK(N4)<N3 AND J<>N0 THEN
    J=N0:G1=N0:A=N7:GOTO 3750
IY 3642 FOR I=N1 TO N10:G2=HAND2(N4,I):IF
    G2=N0 THEN 3645
XU 3643 F1=N4:I=N10
SJ 3645 NEXT I:IF G2<>N0 THEN 1200
HB 3650 IF F2<>N1 THEN 3720
ER 3660 IF CHK(N2)=N0 AND CHK(N3)=N0 AND
   CHK(N4)=N0 THEN 3680
WJ 3670 G2=N0:GOSUB 4500:IF G2<>N0 THEN J
   =G2:G1=F1:GOTO 3750
TX 3676 GOTO 3720
TF 3680 FOR I=N1 TO N13:G2=HAND2(N1,I):IF
    G2=N0 THEN 3710
YP 3690 F1=N1:I=N13
KH 3710 NEXT I:GOTO 1200
SZ 3720 A=N10:M=N0:B2=N0:B3=N0:L=N0:IF CH
   K(F2)=N1 AND K<>F2 THEN 4000
RM 3725 J=N0:G1=N0:IF K=F2 THEN 3750
TX 3728 FOR I=N13 TO N1 STEP -N1:G2=HAND2
   (F2,I):IF G2=N0 THEN 3740
FW 3730 J=I:G1=F2:I=N1
FR 3740 NEXT I
AC 3750 B2=N0:F1=N0:IF J1=N1 THEN GOSUB 4
   500:IF G2<>N0 THEN B2=G2:F1=N1:GOTO 37
   80
MO 3751 IF J1=N1 THEN J=N0:GOTO 3780
MW 3752 IF K=J1 THEN 3780
XW 3753 A=N0:IF J1=N4 THEN GOSUB 4100:A=N
   13:GOTO 3780
FN 3755 FOR I=N13 TO N1 STEP -N1:G2=HAND2
   (J1,I):IF G2=N0 THEN 3770
YF 3760 B2=I:F1=J1:I=N1
GA 3770 NEXT I
MX 3780 B3=N0:A1=N0:FOR I=N2 TO N4:IF I=J
   1 OR I=F2 THEN 3785
KK 3782 IF B3=N0 THEN B3=I:GOTO 3785
NK 3784 A1=I:I=N4
GX 3785 NEXT I
ZD 3786 IF J1<>N1 AND F2<>N1 AND CHK(B3)=
   N0 AND CHK(N1)<>N0 THEN B3=N1:GOSUB 42
   00:J2=N1:M=G2:B3=(G2<>N0):GOTO 3900
XM 3788 IF CHK(B3)=N0 THEN B3=A1
NR 3790 M=N0:J2=N0:IF K=B3 THEN 3900
ZA 3792 IF B3=N1 THEN GOSUB 4200:IF G2<>N
   0 THEN M=G2:J2=N1:GOTO 3900
FZ 3793 IF B3=N4 THEN GOSUB 4100:IF G2<>N
   0 THEN M=G2:J2=N4:GOTO 3900
II 3794 FOR I=N13 TO N1 STEP -N1:G2=HAND2
   (B3,I):IF G2=N0 THEN 3800
ID 3795 M=I:J2=B3:I=N1
VH 3800 NEXT I:IF (M>10 AND J2=N4) AND ((
   HI(N4,N11)<>N0 AND HAND2(N4,N11)=N0) O
   R (HAND2(N4,N11)=N11 AND CHK(N4)=N2))
   THEN M
FG 3830 REM M=N0:J3=N0:IF K=A1 THEN 3900
JL 3900 IF J=N0 AND B2=N0 AND M=N0 THEN 3
   680
QO 3950 GOTO 4300
KA 4000 G1=20:J=N0:FOR I=N13 TO N1 STEP -
   N1:G2=HAND2(F2,I):IF G2=N0 THEN 4030
PP 4020 F1=F2:I=N1
KA 4030 NEXT I:GOTO 1200
JV 4100 IF HI(N4,N11)=N0 THEN RETURN
RV 4110 FOR I=N10 TO N1 STEP -N1:G2=HAND2
   (N4,I):IF G2=N0 THEN 4130
BN 4120 F1=N4:B2=I:I=N1
GL 4130 NEXT I:RETURN
GO 4200 FOR I=N1 TO N5:G2=HAND2(N1,I):IF
   G2=N0 THEN 4240
XD 4220 I=N6
GQ 4240 NEXT I:RETURN
QD 4300 FOR I=N1 TO N4:SS(I)=N0:NEXT I
ZH 4310 SS(N1)=G1:SS(N2)=F1:SS(N3)=J2:SS(
   N4)=G1
SQ 4312 IF J=N0 THEN SS(N1)=N0:SS(N4)=N0
IR 4314 IF B2=N0 THEN SS(N2)=N0
DN 4316 IF M=N0 THEN SS(N3)=N0
IE 4320 R=INT(N4*RND(N0)+N1):IF SS(R)=N0
   THEN 4320
LY 4324 IF R=N4 THEN R=N1
KX 4330 F1=SS(R):IF R=N1 THEN G2=J:GOTO 1
   200
HZ 4340 IF R=N2 THEN G2=B2:GOTO 1200
HV 4350 G2=M:GOTO 1200
VH 4380 J=N13:B2=N0:FOR T=N3 TO N1 STEP -
   N1:FOR I=N1 TO N13:IF CHK(T)=N0 THEN I
   =N13:GOTO 4430
LV 4390 G2=HAND2(T,I):IF G2=N0 THEN 4430
RO 4400 IF G2<J THEN J=G2:B2=T
XH 4430 NEXT I:NEXT T:G2=J:F1=B2:GOTO 120
   0
QS 4500 FOR I=N1 TO N6:G2=HI(N1,I):IF G2=
   N0 THEN 4540
LM 4520 G2=HAND2(N1,I):IF G2=N0 THEN 4540
XM 4530 I=N6
UD 4540 NEXT I:IF G2<>N0 THEN F1=N1
BB 4550 RETURN
ZO 4600 J=N13:B3=N0:FOR T=N1 TO N4:FOR I=
   N1 TO N13:IF CHK(T)=N0 OR T=F1 THEN I=
   N13:GOTO 4640
PF 4610 G2=HAND2(T,I):IF G2=N0 THEN 4640
SX 4620 IF G2<J THEN J=G2:B3=T
UG 4640 NEXT I:NEXT T:IF B3<>N0 THEN F1=B
   3:G2=J
BG 4660 RETURN
IY 4800 FOR T=N1 TO N4:J1=N0
LQ 4810 FOR I=N1 TO N13:J1=HAND1(T,I):IF
   J1<>N0 THEN I=N13:SS(T)=N1
YW 4820 NEXT I:IF J1=N0 THEN SS(T)=N0
LQ 4830 NEXT T:RETURN
BX 5000 GOSUB 4800
WN 5005 G2=N0:A=N0:G1=N0:FOR T=N4 TO N1 S
   TEP -N1:IF SS(T)=N0 OR CHK(T)=N0 THEN
   5060
XA 5010 A=N2:FOR I=N1 TO N13
WP 5020 G2=HI(T,I):IF G2=N0 THEN 5050
WG 5030 G2=HAND2(T,I):IF G2=N0 THEN I=N13
   :GOTO 5050
IG 5040 F1=T:G1=G2:I=N13:T=N1
FI 5050 NEXT I
LS 5060 NEXT T:IF G2=N11 AND F1=N4 THEN 5
   170
ZJ 5065 IF G2=N0 THEN 5100
VT 5080 G2=G1:GOTO 1200
AM 5100 A=N11:F2=N0:J=N13:G1=N0:FOR T=N4
   TO N1 STEP -N1:IF SS(T)=N0 OR CHK(T)=N
   0 THEN 5160
JK 5110 FOR I=N1 TO N13
KY 5120 G2=HAND2(T,I):IF G2=N0 THEN 5150
ZR 5130 IF G2=N11 AND T=N4 THEN G1=G2
LV 5140 IF G2<J THEN J=G2:F2=T:I=N13
FK 5150 NEXT I
JM 5160 NEXT T:IF G1<>N11 AND F2<>N0 THEN
    G2=J:F1=F2:GOTO 1200
CS 5163 IF G1<>N11 THEN 5400
AP 5170 A=N7:B2=N0:FOR I=N13 TO N12:F=HI(
   N4,I):IF F=N0 THEN 5190
MN 5180 IF HAND2(N4,I)=I THEN 5190
KM 5184 B2=N11
CA 5190 NEXT I:IF B2=N0 THEN 5400
LJ 5200 B2=N0:FOR I=N1 TO N10:G2=HI(N4,I)
   :IF G2=N0 THEN 5230
YE 5210 G2=HAND2(N4,I):IF G2=N0 THEN I=10
   :B2=N0:GOTO 5230
MM 5220 B2=G2
BK 5230 NEXT I:IF B2=N0 THEN 5400
RW 5240 F1=N4:G2=N11:GOTO 1200
NZ 5400 G1=N0:A=N52:FOR T=N2 TO N4:FOR I=
   N1 TO N13
NS 5410 G2=HAND2(T,I):IF G2=N0 THEN 5440
DX 5420 IF G2=N11 AND T=N4 THEN G1=G2:GOT
   O 5440
IZ 5430 F1=T:T=N4:I=N13
WV 5440 NEXT I:NEXT T:IF G2<>N0 THEN GOTO
    1200
CY 5450 FOR I=N1 TO N13:G2=HAND2(N1,I):IF
    G2=N0 THEN 5470
YE 5460 F1=N1:I=N13
RW 5470 NEXT I:IF G2<>N0 THEN 1200
NG 5480 G2=G1:F1=N4:GOTO 1200
HH 6000 IF LY=TRUMP AND F1<>TRUMP THEN K=
   F1:GOTO 6020
LT 6003 IF LY=F1 AND LY=K THEN K=N0
HD 6005 IF (BEST>CARD1 AND F1=LY) OR (LY<
   >TRUMP AND F1=TRUMP) THEN 6030
UP 6010 IF FLAG=N1 AND F1<>LY THEN K=F1:G
   OSUB 6800:GOTO 6030
TL 6020 B=C2:B1=T2:D=C1:D1=T1:K=N0:GOSUB
   6140:GOTO 6040
TA 6030 B=C1:B1=T1:D=C2:D1=T2:GOSUB 6100
IU 6040 IF CD>N52 THEN 6060
HC 6043 HAND2(B1,B)=B:HAND1(D1,D)=D
ZI 6060 HAND2(F1,BEST)=N0
GJ 6065 GOSUB 6200:GOSUB 7500:CD=CD+N2
RC 6070 HI(F1,BEST)=N0:RETURN
LJ 6100 FLAG=N1:IF GM$="H" THEN GOSUB 684
   0:RETURN
XQ 6110 AT=AT+N1:RETURN
PT 6140 FLAG=N0:IF GM$="H" THEN GOSUB 687
   0:RETURN
GC 6150 PS=PS+N1:RETURN
AM 6200 GOSUB 7200
BP 6210 FOR I=N0 TO N3:POSITION N8,I:? #N
   6;"      ":POSITION 29,I:? #N6;"     ":NE
   XT I
VT 6230 FOR I=N0 TO N3:POSITION 20,I:? #N
   6;"     ":NEXT I
IF 6295 IF CD>N52 THEN RETURN
HI 6300 R=FLAG
UL 6310 F=N1-(2*(FLAG=N1)):POKE 53249,110
   :FOR I=N1 TO 56+((FLAG=N0)*10)
QQ 6320 POKE 53249,110+F*I:NEXT I:POKE 53
   249,N0
DW 6325 IF CD=51 THEN POSITION 17,N1:? #N
   6;"  ":POSITION 17,N2:? #N6;"  ":POKE
   53250,N0
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HK 6330 IF R=FLAG THEN FLAG=ABS(FLAG-N1):GOTO 6310
KI 6350 FLAG=R:RETURN
KS 6400 GOSUB 8850:POSITION N5,N1:? #N6;"no cards left in deck"
VS 6410 FOR I=N1 TO 38:POKE DL+N7,I:GOSUB 6700:NEXT I:SOUND N1,N0,N0,N0
XI 6420 FOR I=N1 TO 120:IF STICK(N0)<>15 OR STRIG(N0)=N0 THEN I=120:NEXT I:GOTO 6430
GC 6425 NEXT I
ZL 6430 IF GM$="W" THEN 6470
SN 6440 FOR I=N1 TO N4:SS(I)=N1:IF K=I THEN SS(I)=N0
FR 6450 NEXT I
OU 6470 GOSUB 8800:POKE DL+N7,N0:RETURN
SZ 6500 POKE 53248,N0:S$=STR$(PS):GOSUB 6650
DY 6510 GOSUB 8850:POSITION N1,N1:? #N6;"final score        you scored ";S$;
RT 6520 S$=STR$(AT):GOSUB 6650:? #N6;"  atari scored ";S$
MA 6530 FOR I=N1 TO 54:POKE DL+N7,I:GOSUB 6700:SOUND N0,N0,N0,N0:NEXT I:SOUND N1,N0,N0,N0
BU 6540 GOSUB 16000:GOSUB 8850
MO 6570 FOR T=80 TO 10 STEP -N2:SOUND N0,T*N2,10,N6:FOR W=N1 TO N3:NEXT W:SOUND N0,N0,N0,N0:NEXT T
RP 6580 FP=ABS(FP-N1):FLAG=FP
DC 6585 IF STRIG(N0) THEN 6585
AJ 6590 POKE 77,N0:GOSUB 6750
GS 6600 IF PS=AT THEN 6620
NS 6602 IF GM$="H" THEN 6610
AR 6605 IF PS>AT THEN PG=PG+N1:GOTO 6620
HR 6608 AG=AG+N1:GOTO 6620
ZE 6610 IF PS<AT THEN PG=PG+N1:GOTO 6620
ZL 6614 AG=AG+N1
YP 6620 GAME=GAME+N1:S$=STR$(GAME):GOSUB 6650:POSITION N0,N0:? #N6;"game ";S$;:S$=STR$(PG):GOSUB 6650
MY 6630 ? #N6;"    you ";S$;:S$=STR$(AG):GOSUB 6650:? #N6;" me ";S$
TS 6640 GOSUB 8800:GOSUB 19012:GOTO 180
AX 6650 FOR L=N1 TO LEN(S$):T=VAL(S$(L,L)):T=T+35:S$(L,L)=CHR$(T):NEXT L:RETURN
JY 6700 FOR W=N1 TO N2:SOUND N0,33,N10,N6:SOUND N1,43,N10,N6:NEXT W:SOUND N0,N0,N0,N0:RETURN
RM 6750 POKE DL+N7,N0:FOR I=N0 TO N2:POSITION N0,I:? #N6;"                                       ":NEXT I:RETURN
LZ 6800 IF CD<53 THEN RETURN
KF 6810 SS(F1)=N0:RETURN
LT 6840 AT=AT+(F1=N1)+(LY=N1)
GC 6850 IF (CARD1=N11 AND LY=N4) OR (F1=N4 AND G2=N11) THEN AT=AT+N5:GOTO 6860
CD 6855 RETURN
HU 6860 GOSUB 8850:POSITION N1,N0:? #N6;"          i got the black maria       ":GOSUB 6900:GOTO 6890
UC 6870 PS=PS+(F1=N1)+(LY=N1)
HU 6875 IF (G2=N11 AND F1=N4) OR (LY=N4 AND CARD1=N11) THEN PS=PS+N5:GOTO 6880
CR 6877 RETURN
SX 6880 GOSUB 8850:POSITION N1,N0:? #N6;"        you got the black maria      ":GOSUB 6940
ZA 6890 GOSUB 6750:GOSUB 8800:RETURN
PO 6900 FOR I=30 TO 50:SOUND N0,I,N12,N10:POKE 710,I*4:NEXT I:SOUND N0,N0,N0,N0:POKE 710,N0:RETURN
RC 6940 FOR W=N11 TO N4 STEP -0.5:SOUND N0,15+W,N10,I:SOUND N1,30+W,N10,I:NEXT W
GN 6945 FOR W=N1 TO N6:FOR I=N7 TO N4 STEP -N1:SOUND N0,15-W,N8,N3:SOUND N1,30+I+W,N10,I:POKE 710,I*20:NEXT I
MA 6950 SOUND N0,N0,N0,N0:NEXT W:SOUND N1,N0,N0,N0:POKE 710,N0:RETURN
XR 7000 T=N1
BY 7010 IF CARD>N13 THEN CARD=CARD-N13:T=T+N1:GOTO 7010
AO 7030 RETURN
WF 7100 S$="_♥[|":H$=";:":IF T>N1 THEN S$="_♣\|":H$="<="
TD 7110 IF T>2 THEN S$="_♦]|":H$=">-":IF T>3 THEN S$="_♠^|":H$="/."
MG 7150 F=CARD+N1:A$=STR$(F):A$(N2,N2)="/"
QU 7155 IF F>9 THEN A$="10":IF F>10 THEN A$="J/":IF F>11 THEN A$="Q/":IF F>12 THEN A$="K/"
SG 7156 IF F>N13 THEN A$="A/"
EA 7157 FOR W=N0 TO N1:SOUND N0,N13,N8,N4:NEXT W:SOUND N0,N0,N0,N0
HA 7160 POSITION B,B1:? #N6;"┌──┐":POSITION B,B1+N1:? #N6;"_";A$:POSITION B+N3,B1+N1
SN 7170 ? #N6;"|":POSITION B,B1+N2:? #N6;S$:POSITION B,B1+N3:? #N6;"└";H$;"┘":RETURN
IM 7200 FOR W=N1 TO 80:NEXT W:RETURN
EJ 7300 POKE 82,N0:FOR T=N1 TO N4:A=N0:B=N1:FOR I=N1 TO N13
RN 7310 CARD=HAND1(T,I):IF CARD=N0 THEN 7350
UK 7320 B1=N3+T*N4:GOSUB 7100
OB 7335 HAND$((T*N13-N12)+A,(T*N13-N12)+A)=CHR$(CARD):A=A+N1
QO 7340 B=B+N3:IF B>36 THEN B=N1
UG 7350 NEXT I:NEXT T:RETURN
FM 7500 A=D1*N13-N12:IF CD>N52 THEN RETURN
GU 7510 CARD=D:B=N1:B1=N3+D1*N4:T=D1
CG 7520 IF HAND$(A,A)<>"♥" THEN A=A+N1:B=B+N3:GOTO 7520
GH 7530 HAND$(A,A)=CHR$(D):GOSUB 7100
ZL 7540 IF HAND$(A+N1,A+N1)="♥" THEN 7570
XV 7550 POSITION B+N3,B1:? #N6;"┐":POSITION B+N3,B1+N1:? #N6;"_":POSITION B+N3,B1+N2:? #N6;"_"
EW 7560 POSITION B+N3,B1+N3:? #N6;"└"
BK 7570 RETURN
MM 8800 POKE 88,160:POKE 89,147:RETURN
XU 8850 POKE 88,N0:POKE 89,136:RETURN
BB 8900 IF FLAG=N0 THEN GOSUB 8850:POSITION N1,N0:? #N6;"your lead":POSITION 28,N0:? #N6;"           "
FM 8980 GOSUB 8800
KL 9000 S=STICK(N0):IF STRIG(N0)=N0 THEN 9300
YM 9020 IF S=15 THEN 9000
NT 9030 POKE 77,N0:H=(S=N7)-(S=11)
IT 9040 V=(S=N13)-(S=14):IF V<>N0 THEN PM$(Y,Y+30)=BL$
RH 9100 X=X+N12*H:IF X<50 THEN X=50:LX=N1:GOTO 9160
AZ 9110 IF X>194 THEN X=194:LX=N13:GOTO 9160
YW 9120 Y=Y+32*V:IF Y<92 THEN Y=92:LY=N1:GOTO 9160
EW 9130 IF Y>188 THEN Y=188:LY=N4:GOTO 9160
SU 9140 LX=LX+H:LY=LY+V
SX 9160 POKE 53248,X:PM$(Y,Y+30)=B1$:GOTO 9000
IG 9300 L1=LY*N13-N13+LX:CARD=ASC(HAND$(L1,L1)):IF CARD=N0 THEN 9500
HP 9301 IF FLAG=N0 THEN Q=N0:GOTO 9310
OB 9302 Q=N1:IF LY=F1 THEN 9310
UU 9306 FOR I=N1 TO N13:IF HAND1(F1,I)<>N0 THEN I=N13:NEXT I:GOTO 9500
GF 9307 NEXT I
LW 9310 FOR I=N8 TO N0 STEP -1.5:SOUND N0,58,10,I:NEXT I:SOUND N0,N0,N0,N0:CARD1=CARD
DO 9320 FOR I=N3 TO N6:POSITION (LX+N1)*N3-N5,LY*N4+I:? #N6;"    ":NEXT I
AU 9322 HAND$(L1,L1)="♥"
MC 9324 IF LX=N1 THEN FOR I=N4 TO N6:POSITION LX,LY*N4+I:? #N6;" ":NEXT I:GOTO 9340
KT 9326 IF HAND$(L1-N1,L1-N1)="♥" THEN 9340
CV 9330 B=(LX+N1)*N3-N5:B1=LY*N4+N3:POSITION B,B1:? #N6;"┐":POSITION B,B1+N1:? #N6;"|":POSITION B,B1+N2:? #N6;"|"
GZ 9334 POSITION B,B1+N3:? #N6;"┘"
IM 9340 IF HAND$(L1+N1,L1+N1)="♥" THEN 9350
LG 9342 B=(LX+N1)*N3-N2:B1=LY*N4+N3:POSITION B,B1:? #N6;"┌":POSITION B,B1+N1:? #N6;"_"
MB 9344 POSITION B,B1+N2:? #N6;"_":POSITION B,B1+N3:? #N6;"└"
YT 9350 T=LY:B=N8:B1=N0:HAND1(LY,CARD)=N0:GOSUB 7100:HI(LY,CARD)=N0:RETURN
AR 9500 FOR I=N1 TO N12:SOUND N0,202,N12,N8:NEXT I:SOUND N0,N0,N0,N0:GOTO 9000
TV 16000 GOSUB 8800:IF PS=AT THEN RESTORE 16500:GOTO 16230
IU 16010 IF GM$="H" THEN 16100
WE 16020 IF PS>AT THEN RESTORE 16300:GOTO 16200
CA 16040 RESTORE 16400:GOTO 16200
XE 16100 IF PS>AT THEN RESTORE 16400:GOTO 16200
KN 16120 RESTORE 16300
WZ 16200 FOR I=N1 TO N3:READ HAND$:POSITION N4,N7+I:? #N6;HAND$:NEXT I
SU 16210 FOR I=N4 TO N6:READ HAND$:POSITION N5,N7+I:? #N6;HAND$:NEXT I:RETURN
TG 16230 FOR I=N1 TO N6:READ HAND$:POSITION N5,N8+I:? #N6;HAND$:NEXT I:RETURN
CK 16300 DATA | | ||| | |   |   | ||| ||
HO 16310 DATA | | | | | |   |   | | | |||
OC 16320 DATA ||| | | | |   |   | | | ||||
KW 16340 DATA |  | | | |   | | | | | | ||
EI 16350 DATA |  ||| |||   ||||| ||| |  |
OW 16360 DATA |  ||| |||   || || ||| |  |
JB 16400 DATA | | ||| | |   |   ||| ||| |||
JT 16410 DATA | | | | | |   |   | | ||
DP 16420 DATA ||| | | | |   |   | | ||||
WD 16430 DATA |  | | | |   |   | |   |  |
WH 16440 DATA |  | | | |   |   | |   |  |
CX 16450 DATA |  ||| |||   ||| ||| |||  |
FQ 16500 DATA |||   ||  ||| ||| |   |
DQ 16510 DATA | |   | | | | | | |   |
DU 16520 DATA | |   | | | | | | |   |
CQ 16530 DATA |||   | | ||  ||| | | |
RU 16540 DATA | |   | | | | | | | | |
TS 16550 DATA | |   ||  | | | | |||||
MZ 19000 DIM PACK(N52),HAND1(N4,N13),HAND2(N4,N13),S$(8),H$(N4),LAY$(N4),A$(N2),CARD$(40),HAND$(52),CHK(N4)
ZT 19008 DIM HI(N4,N13),GM$(N1),SS(N4)
FI 19010 T=INT(N2*RND(N0)):IF T=N0 THEN FLAG=N1:FP=FLAG
OI 19012 ? #N6;"K":GOSUB 19400
ZW 19015 AT=N0:PS=N0:HAND$(N1)="♥":HAND$(N52)="♥":HAND$(N2)=HAND$
CD 19016 GOSUB 19300:FOR I=N1 TO N4:SS(I)=N1:NEXT I:TRUMP=N0
CG 19020 GOSUB 110
LR 19100 A=0:FOR I=N1 TO N13:CARD=PACK(I):GOSUB 7000:HAND1(T,CARD)=CARD
VG 19110 CARD=PACK(I+N13):GOSUB 7000:HAND2(T,CARD)=CARD:NEXT I:CD=27:GOSUB 8800
LT 19120 GOSUB 7300:CARD=PACK(CD):IF GM$="H" THEN 19190
QJ 19125 GOSUB 7000:TRUMP=T:S$="hearts":IF T>N1 THEN S$="clubs"
PY 19130 IF T>N2 THEN S$="diamonds":IF T>N3 THEN S$="spades"
YO 19140 GOSUB 8850:FOR I=N0 TO N2:POSITION N0,I:? #N6;"                                       ":NEXT I
MA 19160 POSITION N12,N0:? #N6;"trumps ";S$
PA 19190 GOSUB 8800:RETURN
PK 19300 GOSUB 8850:POSITION 28,N0:? #N6;"please wait":RETURN
JM 19400 POSITION N0,N4:? #N6;"________________________________________"
OU 19402 POSITION N0,N6:? #N6;"‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾"
WE 19408 GM$="W":GOSUB 8850:POSITION 28,N0:? #N6;" which game "
LY 19410 GOSUB 8800:POSITION N8,N7:? #N6;"______________________":POSITION N8,N8:? #N6;"///WALBURGE/WHIST///"
XI 19412 FOR I=N9 TO N10:POSITION N8,I:? #N6;"//////////////////////":NEXT I
PI 19420 POSITION N8,N10:? #N6;"////BLACK/MARIA////"
NV 19430 POSITION N9,N8:? #N6;"┤ "
WZ 19440 A=STICK(N0):IF STRIG(N0)=N0 THEN 19480
QP 19445 IF A=15 THEN 19440
KO 19450 IF A=13 THEN POSITION N9,N10:? #N6;"┤ ":POSITION N9,N8:? #N6;"/":GM$="H"
KT 19460 IF A=14 THEN POSITION N9,N8:? #N6;"┤ ":POSITION N9,N10:? #N6;"/":GM$="W"
GL 19470 GOTO 19440
```

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WHIST

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GO 19480 FOR I=N10 TO N0 STEP -N3:SOUND N
   0,80,N10,N10:SOUND N1,160,N10,I:NEXT I
   :SOUND N0,N0,N0,N0:SOUND N1,N0,N0,N0
MC 19490 FOR I=N7 TO N10:POSITION N6,I:?
   #N6;"                          ":NEXT I
AO 19500 L=INT(N12*RND(N0)+N2)*16+N10
EU 19505 IF GM$="H" THEN POKE 712,178:POK
   E 704,182:POKE 705,L:POKE 706,L:GOTO 1
   9515
AN 19510 POKE 712,114:POKE 704,118:POKE 7
   05,L:POKE 706,L
FJ 19515 GOSUB 8850:GOSUB 6750:PM$(Y,Y+30
   )=BL$
JY 19520 X=50:Y=92:PM$(Y,Y+30)=B1$
QE 19530 LX=N1:LY=N1:POKE 53248,X:RETURN
NP 20000 POKE 82,N0:? :FOR T=N1 TO N4:FOR
    I=N1 TO N13:? HAND2(T,I);" ";:NEXT I:
   ? :NEXT T:END
LN 20010 POKE 82,N0:? :FOR T=N1 TO N4:FOR
    I=N1 TO N13:? HAND1(T,I);" ";:NEXT I:
   ? :NEXT T:END
BM 22000 N0=0:N1=1:N2=N1+N1:N3=N2+N1:N4=N
   2+N2:N5=N4+N1:N6=N3+N3:N7=N6+N1:N8=N7+
   N1:N9=N8+N1:N10=N8+N2:N11=N8+N3
KO 22003 N12=N8+N4:N13=N12+N1:N52=52:GAME
   =N0:PG=N0:AG=N0:TRUMP=N0
OF 22005 POKE 106,152:GRAPHICS 28:POKE 71
   0,N0:POKE 708,50:POKE 709,14:POKE 712,
   114
JQ 22010 OPEN #N1,N4,N0,"D1:GMK15"
KR 22020 C=848:POKE C+N2,N7
PF 22030 H=156:L=N0:POKE C+N4,L:POKE C+N5
   ,H
ID 22040 H=N4:L=N0:POKE C+8,L:POKE C+9,H
UU 22050 D=USR(ADR("hhh LV "),16)
NY 22060 CLOSE #1:POKE 756,156
EZ 27230 PM$(N1)="♥":PM$(600)="♥":PM$(N2)
   =PM$
XU 27250 B1$="♥♥>>>>>>>>>>>>>>>>>>>>>>>>>>
   >♥♥"
BW 27254 BL$="♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥
   ♥♥♥"
WQ 27256 PCD$="♥♥?++55++55++55++5+5++55++
   55++?♥♥♥♥"
IH 27260 PM$(N1)="♥":PM$(450)="♥":PM$(N2)
   =PM$
EF 27280 I=PEEK(106)-16:POKE 704,134:POKE
    559,62:POKE 623,N4
QB 27290 POKE 54279,I:POKE 53256,N1:POKE
   53277,N3:VTAB=PEEK(134)+PEEK(135)*256:
   ATAB=PEEK(140)+PEEK(141)*256
SH 27300 OFFS=I*256+1024-ATAB:HI=INT(OFFS
   /256):LO=OFFS-HI*256:POKE VTAB+N2,LO:P
   OKE VTAB+N3,HI
KB 27310 Y=92:POKE 53257,N1:POKE 53258,N1
   :PM$(290,323)=PCD$
US 27312 PCD$="♥♥?++55++55+!!!!!!!!!!55++
   55++?♥♥♥♥":PM$(546,579)=PCD$:POKE 623,
   16
DZ 27400 DL=PEEK(560)+256*PEEK(561)+N4
WA 27410 POKE DL+N6,66:POKE DL+N7,N0:POKE
    DL+8,136:POKE DL+9,68:POKE DL+10,144:
   POKE DL+11,148
QH 27430 FOR I=N12 TO 28:POKE DL+I,N4:NEX
   T I
VL 27450 POKE DL+29,65:POKE DL+30,PEEK(56
   0):POKE DL+31,PEEK(561)
DT 27460 POKE 88,N0:POKE 89,136:POSITION
   N0,N0:? #N6;"
                 ":GOSUB 8800:RETURN
MN 27500 GRAPHICS 18:POKE 708,112:POKE 70
   9,112:POKE 710,112:POKE 712,112:B=112:
   D=707:POKE 40554,6
DB 27530 POSITION 3,3:? #6;"WALBURGE WHIS
   T":C=0:R=193:GOSUB 27600
HK 27540 POSITION 8,4:? #6;"and":R=152:GO
   SUB 27600
WG 27550 POSITION 4,5:? #6;"BLACK MARIA":
   R=125:GOSUB 27600
QT 27560 POSITION 3,9:? #6;"by les howart
   h":R=90:GOSUB 27600
YV 27570 FOR W=1 TO 50:NEXT W
LZ 27580 FOR I=0 TO 3:SOUND I,0,0,0:NEXT
   I
FL 27590 RETURN
JY 27600 D=D+1:R=R+10
IK 27610 FOR W=1 TO 14:SOUND C,R,10,W
CP 27640 POKE D,W+B:NEXT W:C=C+1:RETURN :
   RETURN
```

```
XT 27993 REM ***************************
FM 27994 REM *    WHIST - LISTING 2     *
JK 27995 REM *      Character Set       *
PO 27996 REM *--------------------------*
PM 27997 REM *     PAGE 6 MAGAZINE      *
YS 27998 REM ***************************
FV 27999 REM
OW 28000 RESTORE 29000:OPEN #1,8,0,"D:GMK
   15"
VA 28010 FOR I=0 TO 1023:READ D:PUT #1,D:
   NEXT I:CLOSE #1:END
NI 29000 DATA 0,0,0,0,0,0,0,0,0,4,20,4,4,
   4,21,0,0,102,102,102,0,0,0,0
LI 29010 DATA 60,102,102,102,102,102,102,
   60,24,56,120,24,24,24,24,126,60,102,6,
   12,24,48,96,126
UU 29020 DATA 126,6,14,28,6,6,102,60,12,2
   8,60,60,108,126,12,12,126,96,96,124,6,
   6,102,60
SB 29030 DATA 60,102,96,124,102,102,102,6
   0,126,6,6,14,12,12,24,24,60,102,102,60
   ,102,102,102,60
MQ 29040 DATA 60,102,102,62,6,6,102,60,10
   6,106,170,170,170,170,170,255,250,234,
   250,254,170,170,170,255
XG 29050 DATA 175,171,175,191,170,170,170
   ,255,254,238,238,238,238,254,170,170,1
   86,250,186,186,186,254,170,170
QR 29060 DATA 191,171,191,186,186,191,170
   ,170,191,171,191,171,171,191,170,170,1
   87,187,187,191,171,171,170,170
KU 29070 DATA 191,186,191,171,171,191,170
   ,170,191,186,191,187,187,191,170,170,1
   91,171,171,171,171,171,170,170
JR 29080 DATA 191,187,191,187,187,191,170
   ,170,191,187,191,171,171,191,170,170,1
   86,170,170,170,170,170,170,255
TY 29090 DATA 165,165,169,169,170,170,170
   ,255,251,171,171,191,170,170,170,255,1
   90,170,170,250,170,170,170,255
PZ 29100 DATA 165,165,169,169,170,170,170
   ,255,0,60,102,12,24,0,24,0,81,68,81,68
   ,81,68,81,68
LO 29110 DATA 191,187,187,191,187,187,170
   ,170,190,187,190,187,187,190,170,170,1
   91,186,186,186,186,191,170,170
JF 29120 DATA 190,187,187,187,187,190,170
   ,170,191,186,191,186,186,191,170,170,4
   2,32,42,32,32,32,0,0
LD 29130 DATA 191,186,186,187,187,191,170
   ,170,187,187,191,191,187,187,170,170,1
   91,174,174,174,174,191,170,170
RT 29140 DATA 171,171,171,171,187,174,170
   ,170,187,187,190,190,187,187,170,170,1
   86,186,186,186,186,191,170,170
WR 29150 DATA 187,191,187,187,187,187,170
   ,170,42,34,34,34,34,34,0,0,42,34,34,34
   ,34,42,0,0
PX 29160 DATA 42,34,34,42,32,32,0,0,191,1
   87,187,187,187,190,171,170,190,187,187
   ,190,187,187,170,170
ER 29170 DATA 191,186,191,171,171,191,170
   ,170,191,174,174,174,174,174,170,170,1
   87,187,187,187,187,191,170,170
YI 29180 DATA 34,34,34,34,34,8,0,0,187,18
   7,187,187,191,187,170,170,34,34,8,34,3
   4,34,0,0
LU 29190 DATA 34,34,34,42,8,8,0,0,42,2,8,
   8,32,42,0,0,170,90,90,86,86,86,90,90
SG 29200 DATA 170,170,234,234,234,170,190
   ,254,170,170,170,106,106,90,90,106,170
   ,234,234,250,250,254,254,254
LO 29210 DATA 58,58,58,58,58,58,58,58,170
   ,150,86,85,85,85,149,149,125,85,215,85
   ,125,85,215,255
GK 29220 DATA 112,112,240,112,112,112,240
   ,240,176,176,176,176,176,176,176,240,8
   ,8,8,8,8,8,8,8
XJ 29230 DATA 0,0,0,240,176,176,176,176,1
   70,170,170,170,170,170,170,170,0,0,0,2
   55,125,85,215,85
BN 29240 DATA 112,112,240,112,112,112,240
   ,112,0,24,60,126,255,219,24,126,0,0,0,
   168,168,8,8,8
WS 29250 DATA 15,15,15,15,0,0,0,0,240,240
   ,240,240,0,0,0,0,255,255,0,0,0,0,0,0
CY 29260 DATA 0,0,0,0,0,0,255,255,0,0,0,0
   ,240,240,240,240,170,171,175,175,175,1
   71,251,255
VT 29270 DATA 0,0,0,63,58,58,58,58,0,0,0,
   255,170,170,170,170,53,53,55,53,61,53,
   55,53
VW 29280 DATA 0,0,0,63,61,53,55,53,0,0,0,
   240,112,112,240,112,53,53,55,53,61,53,
   55,63
XQ 29290 DATA 17,69,17,69,17,69,17,85,125
   ,85,215,85,125,85,215,85,240,240,240,2
   40,240,240,240,240
AL 29300 DATA 58,58,58,58,58,58,58,63,120
   ,96,120,96,126,24,30,0,0,24,60,126,24,
   24,24,0
UJ 29310 DATA 0,24,24,24,126,60,24,0,0,24
   ,48,126,48,24,0,0,0,24,12,126,12,24,0,
   0
CN 29320 DATA 170,169,169,165,165,149,149
   ,149,62,127,115,115,115,127,115,115,12
   6,115,115,126,115,115,115,126
ES 29330 DATA 62,115,112,112,112,112,115,
   62,126,115,115,115,115,115,115,126,127
   ,112,112,127,112,112,112,127
IP 29340 DATA 127,112,112,127,112,112,112
   ,112,62,115,112,119,119,113,115,62,115
   ,115,115,127,115,115,115,115
II 29350 DATA 127,28,28,28,28,28,28,127,6
   3,14,14,14,14,14,110,60,115,115,118,12
   4,120,126,119,115
UL 29360 DATA 112,112,112,112,112,112,112
   ,127,99,119,127,127,107,99,99,99,126,1
   15,115,115,115,115,115,115
HI 29370 DATA 62,115,115,115,115,115,115,
   62,126,115,115,126,112,112,112,112,62,
   115,115,115,115,115,119,59
EO 29380 DATA 126,115,115,126,115,115,115
   ,115,62,115,112,62,7,3,103,62,127,28,2
   8,28,28,28,28,28
CD 29390 DATA 115,115,115,115,115,115,115
   ,62,115,115,115,115,115,115,62,28,99,9
   9,99,107,127,127,119,99
KE 29400 DATA 99,115,54,30,28,62,119,115,
   115,115,115,115,62,12,12,12,127,3,7,14
   ,28,56,112,127
RP 29410 DATA 170,171,171,175,175,191,191
   ,191,176,176,176,176,176,176,176,176,0
   ,126,120,124,110,102,6,0
XW 29420 DATA 8,24,56,120,56,24,8,0,16,24
   ,28,30,28,24,16,155
```

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MP 22000 REM ***************************
AP 22001 REM *   WHIST - Listing 3      *
PJ 22002 REM * Cassette Modifications   *
AG 22003 REM *--------------------------*
YN 22004 REM *    PAGE 6 MAGAZINE       *
NO 22005 REM ***************************
CL 22006 REM
VY 22007 POKE 106,PEEK(106)-8:GRAPHICS 28
   :POKE 710,N0:POKE 708,50:POKE 709,14:P
   OKE 712,114
XS 22010 CS=PEEK(106):CSBASE=CS*256:X=USR
   (ADR("hh Lh K) +N ♥ M" IMrK PyfLfNJPr♦
   "),CSBASE)
PC 22020 RESTORE 29000:FOR I=0 TO 1023:RE
   AD A:POKE CSBASE+I,A:NEXT I:POKE 756,C
   SBASE/256
```

CONTACT

FOR SALE

ATARI SYSTEM: 800XL, 1010 recorder, 130XE, 1050 disk drive, 1020 printer, touch tablet, 90 original software titles on tape. £420 the lot, preferably all together but will consider splitting into two systems. All hardware boxed. Also PAGE 6 Atari User magazines, dust covers, disk box and spare disks. Tel. Steve on 01-907-6394. Buyer MUST collect (NW London)

XL SYSTEM: Atari 800XL, 1050 Disk Drive, joystick, dust covers, magazines. Lots of software on disk in lockable disk box. All in immaculate condition. Will not separate. £150. Ring 0342 (East Grinstead) 27072

PERIPHERALS: XC11 cassette player £15. Blackthorn printer interface £20. Atari Trak-Ball £10. Microdeal battery backed clock for ST. £18.00. 031-557-311

MAGAZINES: 60+ copies of Antic and Analog. Offers! D. Ryder – Broadhills 379098

EXCHANGE: 1027 LQ printer, c/w spare ink rollers, dust cover, book ATARIWRITER+ disk, all leads etc. offered in exchange for a 1050 drive, or sell at £70. Phone John on (065 76) 363

DISK DRIVE: 1050 good condition, £50. Assorted disks and cartridges £5.00. For details ring 0787 71774

COMPLETE MAGAZINE SALE: PAGE 6 from issue 1 to date, Analog from issue 1 to July 87, Antic from issue 1 to July 87, Atari (ab)User from issue 1 to date. Approx 40+ issues of COMPUTE! ALL for £100.00. Geoff 051-424-424

XL SYSTEM: 800XL, tape deck, software, joystick, magazines. Only £65. Mr.K. Scotney, Pant-Y-Saer, Bwlch, Tynygongyl, Anglesey, Gwynedd, LL74 8RG.

XL KIT: 800XL, 1050 drive, 1029 printer, XC12 recorder, touch tablet, lockable disk box, books, mags, games, utils, dust covers, blank disks, etc. £275. Tel. 061-339-6707

BARGAIN OF '88: 800XL, 1050 Disk Drive, Quickshot joystick, mags, disks. Excellent starter pack. Only £100. Write to M. Leach, 5 Clive Road, Spofforth, Harrogate, HG3 1AT

800 SET UP: Atari 800 and 1050 drive, software, etc. Boxed as new, £240 ono. Phone Tony on 0708 861165

XL PACK: 800XL, 1050 Disk Drive, joystick + disks, £130. Will deliver in Glasgow area. Tel. 0389 75917

XE SYSTEM: 130XE and 1050 Drive with I.S. plate. Speech Synthesizer, word processor, art programs, Turbo-Basic, machine code programs and all games. Complete with 10 manuals. Best offer over £200. Tel. 0723-368781

XL SYSTEM: 800XL (rev.c), 1050 drive and disks £100. 1050 drive with U.S. Doubler and Lazer with software £100. 850 interface with Centronics printer lead £80. De Re Atari £10, You Atari Computer £6, Mapping The Atari (revised), Atari Assembler £5 Telephone CREWE 662386 after 5 pm

DISK DRIVE: 1050 fitted with US DOUBLER and 10 Blank Disks. £70. Phone Steve on Bedford 46419 after 5 pm

XL PACK: 800XL, 1010 tape recorder, 1050 disk drive, 1027 printer, joystick, several books, disks etc. £250 (0980) 33371 5731 (work)

BARGAIN: Atari 800XL + 1010 Data Recorder and 3 Joystick + £250 of up to date software for £80 Tel. Worcester 53524 and ask for Richard.

1027 PRINTER: Complete with AtariWriter+ disk. Hardly Used. Excellent condition £75. Phone Chris Read on Milton Keynes (0908) 568788

XL SYSTEM: Atari 800XL, 1010 Data Recorder, software, books, etc. a bargain at £80. Ring Justin on (06794) 467 after 5 pm

XL SYSTEM: 800XL, 1050 disk drive, Moonraker joystick and abundance of software. £299. Phone 0206 (Colchester) 384873 after 5.30 pm

PRINTERS: Atari 1029 printer AtariWriter+ £90. Also Atari 822 thermal printer, ideal for debugging listings £50. Phone 010-49-2163-83259 or it may be cheaper to write to Shaun Carolan, Laser Bay, EES, RAF Bruggen, BFPO 25

XL SYSTEM: 800XL, 1050 disk drive, touch tablet, Sony joystick, covers and over 70 disks. £150 ono Phone Adrian on Dursley (0453) 45562 after 5 pm

XE SYSTEM: 130XE, 1050 disk drive, 1010 recorder, all good condition with manuals and 60+ original software titles. £210 the lot. Tel. (0608) 737332

XL SYSTEM: XL and 1029 printer and paper, 1050 disk drive, disk box, touch tablet, 1010 and Phonemark tape decks, Assembler/Editor cartridge and many software titles for £460. Tel. 061-962-4935 weekends only.

PROM PROGRAMMER: As circuit in Antic Dec. 85. Incorporates PSU and quality ZIF socket. Uses joystick ports. Operating software on disk, £30. 800XL with PSU, £35. 810 disk drive with Archiver chip and instructions, £85. Phone 0245 269030

TWO ATARIS: 800XL + 400 computers, data recorder, 1050 disk drive, two joysticks and 40 games £170 ono. Tel. 01 641 3132

HARDWARE SALE: 130XE and 1050 drive with touch tablet, joysticks and in excess of 300 disks, 1020 plotter, WS2000 modem plus Datari interface. Phone Seth on 01 845 2570

XL SYSTEM: 800XL, 1050 and 810 disk drives, XC11 tape recorder, joystick, over £200 software, magazines. All in excellent condition. Everything for £250. Contact Dan on 01-229-5612 after 6 pm

1050 DRIVE: Complete with Laser board. Mint condition. Open to offers. (0226) 767685 evenings

XL SYSTEM: 800XL with Ultimon chip, 1050 disk drive, 1010 recorder. £100. Telephone 091-469-2873

HARDWARE OLD AND NEW: 800XL and 800 computers, 1050 and 810 disk drives, 027 NLQ printer, 410 recorder. £300 worth of software. Two complete systems for £295. Steve 0268 551122 after 7.00 pm

INTERFACE CABLES: 850 to modem, 850 to Centronics printer, XL/XE to Scart monitor socket. £25 the lot. May separate. (0226) 767685 evenings

ORIGINAL SET UP: Atari 800, built in Basic, Centronics interface, 810 with Happy and Archiver chips, cassette player, joysticks, software, etc. £130 the lot. Tel. George 061-432-4538 evening or weekends

XE SYSTEM: Atari 130XE, disk drive, 1020 printer, touch tablet, voice master, US Doubler, Ultimon, Light pen Remote joysticks. Bargain of a lifetime at only £600. Call George on 0875 22120 after 6 pm.

PRINTER: 1029 Printer, as new, in original box. £65 Phone Eric on 090 7224334

8-BIT SYSTEM: 800XL, 1050 disk drive with US doubler, 1010 Data Recorder, Joystick, software. All in v.g.c, £170. Write to G. Johnston, 52 Castle Street, Montrose, Scotland.

XL SYSTEM: 800XL, 1050 Disk Drive, 1029 printer, 1010 cassette. Lots of software, mostly new titles, Disks, etc. Worth £822 sell for £355 ono. Tel (0483) 37279 after 4.30 pm.

WANTED

EXPANDO VISION: Does anyone have a copy of Expando Vision for the Atari 800 for sale? Please contact Paul Daniels, c/o 29 Hillersdon Ave, Barnes, London SW13 0EG

FRENCH TELETEL/ST: Is there a Minitel Emulator program for the ST? If you have information, please contact me. Merci d'advance. Jim Flewker, 17 Mill View Gardens, Wrawby, Brigg, DN20 8SY

GERMAN 8-BIT PROGRAMS: I use a 130XE to teach German. Does anyone have any programs written for German users which could interest my pupils. Contact Jim Flewker, 17 Mill View Gardens, Wrawby, Brigg, DN20 8SY

MONITOR: Microvitec 1431 APDS 14" colour monitor in good condition, preferably with swivel and tilt plinth. Please contact Nigel Moore, 65 Station Road, Lakenheath, Brandon, Suffolk. Tel. 0842 860229

PRINTER: Atari 1027 or 1029 printer around £50, good condition. Phone Richard. 0246 203051

BOOK: A copy of 'Inside Atari Dos' – also instructions for Fig-Forth. James Cutler, 44 Water St., Great Harwood, Lancs. BB6 7QR

1029 PRINTER: Will swap Enterprise's warp drive enhancement. More details from Andy Simpson on 0360 – 311330

PRINTER: Atari brand printer in exchange for my Sanyo Betamax VCR. Phone Eddie. 0268 53086

PERIPHERALS: 1050 disk drive working, pay £45. Also 1029 printer, working pay £40. And broken peripherals. Contact Paul Lynch, Millbrook, Oldcastle, Co. Meath, Ireland.

EPSON PRINTER: Epson RX80 with parallel interface cable. Reasonably priced please. Mrs. Hamlyn 0705 584418

MAGAZINES: Any back issues of Compute!, Antic, Analog or any Atari magazine. Also a replacement keyboard for the 400. Contact R. Preddy, 6 Avenue Rd., Staines, Middlesex.

PEN PALS/CONTACT

ST USERS: I want contacts from anywhere in the world. All letters answered. Kieron McMahon, 121 Grange Abbey Crescent, Raheny, Dublin 13, Eire

U.K. ADVENTURERS: I would like to get in touch with adventurers to swap hints, solutions, etc., all letters will be answered. I have an 800XL and a 520ST. Please write to Steven Reid, 9 Troon Place, Papatoetoe, Auckland, New Zealand

ST USERS: To swap hints and tips on a world-wide basis. Will reply to all letters. Pietro Macari, Unit 6, Captains Hill, Leixlid, Co. Kildare, Eire.

I.S. PLATE: Owners of this utility please get in touch so we can swap hints, tips, etc. Write or call: Kev Munro, 48 Sussex St., Bishop Auckland, Co. Durham, DL14 8JD. Tel. 0388-608125

FROM WEST GERMANY: I am aged 16 and looking for pen-pals anywhere in Europe. I own an 800XL and disk drive and will answer your letters promptly. Please write to: Richard Chlup, Sieben Huegel 6, 48 Bielefeld 1, West Germany

AMERICAN PEN PALS: 8-bit pen-pals wanted to swap hints, tips on programming, playing games, any age. Write to Edward Coleman, 56 Eversley Park Road, Winchmore Hill, London N21, England

ST USERS: I am a lonely ST user and I would like to make new friends from anywhere in the world. Please write to David Morgan, 2 Wern Ddu Road, Ammanford, Dyfed, South Wales, SA18 2NE

ST USERS: To exchange public domain software and magazines. All letters replied to. Write to: Antonio Angel, Alpes 620, Lomas, Mexico 11000 D.F., Mexico

8-BITTERS: I own an 800XL, 1050 disk drive and 1029 printer. I'm interested in exchange of hints and tips etc., I will answer all letters if possible, so write to S. Hirst, Tyn-y-Maes, Cemaes, Anglesey, LL67 0DE

XE PEN PALS WANTED: To give me a few tips as I have just become a new Atari owner. All letters replied. Please write to J. Downey, 40 St. Benets Way, Tenterden, Kent, TN30 6QQ

Garry Francis gives his opinion of one of the most talked about adventures of recent times – *after* having finished the game

THE PAWN

Over the past few years, the Adventure column has gradually grown longer and longer and longer until reaching the four page epics of the last few issues. Commencing with this issue, I intend to cut down the length of each article, but from next issue onwards, I'll try to cover two or three Adventures in each issue. This means that I needn't spend as much time on research, the Editor gets more flexibility in magazine layout and you, the readers, get more hints in each issue.

Let me know what you think of the 'cut down' format and, as always, suggestions for future columns are more than welcome. My address is at the end of this article.

Now, as promised last issue, let's take a look at The Pawn.

THE PAWN

I first heard of The Pawn about two years ago when our illustrious Editor told me about a great new Adventure for the ST that had unbelievable graphics (I think he was just trying to get me to buy an ST!). Computer & Video Games previewed The Pawn in April 1986. The article was chock full of superlatives and the accompanying review gave it full marks. I could hardly wait for the 8-bit version to be released.

As The Pawn became available for more and more machines, the computer press gave it rave reviews and glowing comments. Imagine my disappointment when I did eventually buy the game and found it to be a bit of a dog! What had happened? How had the computer community been so thoroughly conned?

When I re-read all the reviews, I realised that some reviewers had been hoodwinked by personal demonstrations from the staff of Magnetic Scrolls. They had obviously been shown how 'clever' the program was without being shown all its shortcomings – not to mention its bugs! Of all the reviews I read, only one of the reviewers had actually completed the game! The others had wandered about the countryside and hadn't even solved any puzzles! This is disgraceful. The end result was (in my opinion) the greatest marketing swindle in Adventure history.

I said there was only one reviewer who had actually finished the game. That happened to be Page 6's own John Sweeney. His is the best and fairest review of the lot (and even then, I think he's a bit generous), so if you're thinking of buying The Pawn, make sure you read John's review first. It's in Page 6 Issue 28 July/August 1987. And please note that 8-bit owners MUST have a 1050 drive or compatible as the disk is in enhanced density.

I played The Pawn on an 800XL, not on an ST. The graphics are good, but not great. I've seen much better. They tend to use monotone colour schemes to enable subtle shading effects, but in a lot of scenes, you can't even tell what the picture is supposed to be! So what's the point of subtle shading?

All except a few pictures at the beginning load from side B of the disk, hence the disk must be flipped twice every time a new picture is displayed. This becomes so frustrating, that I always played with the graphics off unless I discovered some new territory. The graphics aren't necessary to solve the game. On the positive side, the scrolling is superb. It is so smooth and easily controlled that not even an ST could do better.

The plot is devised by a philosophy student – and it shows. (If you've ever known a philosophy student, you'll know what I mean.) Most reviewers comment on the game's sense of humour. It does have a few very funny spots, but the "sense of humour" is more because of the bizarre and unrealistic events – somewhat like Monty Python. Some of it is just plain old bad taste (such as the gratuitous violence, use of alcohol, marijuana and Satanism). It is also heavily influenced by religion and politics, but you'd expect that of a philosophy student. Overall, the game feels 'immature', but I'm sure that will disappear in Magnetic Scrolls' future releases.

The area where The Pawn receives my greatest criticism is the parser. An Adventure parser falls within the area of Artificial Intelligence known as Natural Language Processing. A Natural Language Processor essentially consists of three phases – lexical analysis, syntactic analysis and semantic analysis. In simple terms, lexical analysis is where the input string typed by the user is broken down into separate words and checked to make sure they are in the program's vocabulary. Syntactic analysis is where the program makes sure that the words are arranged in a grammatically valid way. Semantic analysis makes sure that the combination of words makes sense. Then and only then should the program act upon the user's input.

The Pawn's lexical analysis is reasonably good except that the range of verbs is a bit limited. The syntactic analysis suffers by allowing some extremely complex constructs to the detriment of the simple and more commonly used constructs. The player's efforts to communicate with the program sometimes turn into a frustrating session of trial and error.

The game's biggest shortcoming however is the semantic analysis and the resultant command processing. It often produces nonsense replies, grammatical errors, misleading statements, logical inconsistencies and downright mistakes. In other words, it's full of bugs! So beware!

HINTS

When playing The Pawn, there are a few general hints I can offer to make the game as painless as possible. Firstly,

Garry Francis' ADVENTURE HINTS

remember that you have five senses. EXAMINE, FEEL, SMELL, TASTE and LISTEN TO every object you find and every noun in room descriptions. You will usually get a sensible response which bares little or no relevance to the game. It is the odd occasions that it DOES bare some relevance that you will be thankful for this advice. Also try LOOK IN, LOOK UNDER, SEARCH, READ, PUSH and PULL when they seem appropriate.

Ask all the characters about all the other characters. This is the best way to build up a picture of a character's personality, but also helps you to determine who can or cannot be trusted. Any other conversation is pretty limited. The program tries to be clever when conversing with characters, but usually ends up making a fool of itself.

Kronos will appear very early in the game and give you a small task to do. Don't leave it at that. Prod him and probe him and ask all sorts of questions, but whatever you do, don't let him leave (as I did) until he's also given you a major task. You cannot finish the game otherwise.

Save the game before giving objects away, for if your generosity does not achieve the effect you desire, the object is gone forever.

You cannot use the blue key twice! Think about it. Which use gives you the most points?

As John Sweeney pointed out in his review, the game does not appear to have a clear conclusion. It simply fizzles out. The aim is to achieve the full 350 points which are awarded as follows (the descriptions are intentionally vague and in no particular order):

Getting the note	5	Getting the ballot paper	10
Entering the toolshed	5	Feeding the alchemists	10
Making the plant happy	5	Satisfying Jerry Lee Lewis	10
Completing Kronos' first task	5	Completing Kronos' second task	15
Reaching the narrow track	5	Getting the rope	15
Getting the pouch	5	Defeating the snowman	15
Getting the coin	5	Reaching the ledge	15
Getting the black potion	5	Satisfying the porter	15
Moving the boulder	10	Getting rid of the alchemists	20
Stopping the Guru from laughing	10	Entering Kronos' workshop	20
Completing the Guru's task	10	Eliminating Kronos	25
Getting the blue key	10	Voting for the right candidate	30
Entering the staircase room	10	Completing the Devil's task	50
Reaching the rockface	10		
		Total	350

Well, that just about wraps it up for The Pawn (except for the dozens of bugs). If you're still having trouble, refer to the coded hints accompanying this column. Please note that they are a lot more explicit than usual because of the game's difficulty.

NEXT ISSUE

Next issue I'll be covering Lapis Philosophorum, Stranded and (depending on space) maybe one or two others as well. See you then.

Garry Francis, 26 Baringa Road, Earlwood, N.S.W. 2206, Australia

The PAWN

1. Can't remove the silver wristband?
107 51 1 109 3
2. Can't cross the dotted red line?
73 37
3. Can't buy anything from Honest John?
45 20 94 117
4. Can't enter the toolshed?
45 104 11
5. Can't move the wheelbarrow?
86 40
6. Can't plant the pot plant?
122 41 55 91 55 41 55 33 55 41 29 24
7. Can't get past the guards?
68 116
8. Can't stop the Guru laughing?
102 9 29 114
9. Can't open the Guru's cupboard?
86 40
10. Can't get past the boulder?
62 61 76 119 108 29 114 91 60 2 29 61
11. Can't get past the rockfall?
84 3
12. Can't survive the cold?
115 114
13. Can't pick up the snow?
45 65
14. Can't get past the snowman?
81 23
15. Still can't get past the snowman?
50 120 29 23
16. Can't climb the icy ramp?
115 96 8
17. Can't open the door on the landing in the ice tower?
45 89 11
18. Can't get the Princess out of the ice tower?
56 28 91 62 64 10 25 91 106 88
19. Can't open the wooden door in the tree?
45 100 11
20. Can't remove the wooden boards in the tree trunk room?
105 36
21. Can't find a use for the ballot boxes?
111
22. Can't open the safe?
45 89 11
23. Can't enter the lift?
53 31 76 92 91 58 36
24. Can't get the lumps?
45 24
25. Can't cross the lava?
90 98 91 84 87 76 35 121
26. Can't get out of the maze?
44 71
27. Can't get past the alchemists?
68 49 91 68 70
28. Can't open the tomes?
15 52 66 57
29. Can't get past the paper wall?
63 3 29 77 75
30. Can't descend safely from the paper wall?
62 64 10 74 33 13 76 84 3
31. Can't open the double doors?
6 6 6 6 6
32. Can't get past the porter?
34 32
33. Can't see the relevance of Jerry Lee Lewis?
34 32
34. Can't see what's in the fridge?
122 3 29 113 76 80 3 99
35. Can't get past the dragon?
97 23 43 7 91 4 43 7
36. Can't survive even a single move in Kronos' workshop?
21 112 46
37. Can't kill Kronos?
27 47 16 43 72
38. Can't get past the dragon on the return trip?
115 78
39. Can't enter the cream doors?
67 9 76 6
40. Can't escape the brilliant void?
86 40
41. Missing a chit?
38 33 18
42. Missing a coin?
38 22 12 33 95
43. Missing a metal key?
38 33 26
44. Missing a pot plant?
38 22 69
45. Missing a trowel?
80 69
46. Missing a chest?
107 93 109 9 83 85 116
47. Missing a blue key?
38 22 79
48. Missing a wooden key?
38 22 17
49. Missing a light source?
59 10 101
50. Still missing a light source?
14 39 29 110 76 68 10 101 91 80 54
51. Still missing a light source?
48 5 76 19 76 89
52. Missing a ballot paper?
38 33 82
53. Missing a safe?
38 22 30
54. Missing a hard hat?
38 33 95
55. Missing a black potion?
107 103 109 118 94 42 94 9

1 CHARACTERS	32 THIRSTY	63 TEAR	94 OR
2 BOULDER	33 IN	64 ROPE	95 LOUNGE
3 IT	34 HE'S	65 CONTAINER	96 SPIKY
4 POINT	35 BREAK	66 ON	97 SHINE
5 RED	36 DOOR	67 REMOVE	98 EVERYTHING
6 KNOCK	37 SIGN	68 GIVE	99 LATER
7 SHAPES	38 LOOK	69 BENCH	100 WOODEN
8 BOOTS	39 BOWL	70 LUMPS	101 GURU
9 WRISTBAND	40 RIGHT	71 MAZE	102 COVER
10 TO	41 POT	72 HIM	103 DEVIL
11 KEY	42 DEATH	73 READ	104 METAL
12 CUSHION	43 AT	74 HOOK	105 CLOSE
13 CUPBOARD	44 EXIT	75 SHARP	106 GO
14 FILL	45 USE	76 AND	107 ASK
15 CAST	46 FIRST	77 SOMETHING	108 TOGETHER
16 BOTTLE	47 POTION	78 DISGUISE	109 ABOUT
17 MAT	48 MIX	79 PEDESTAL	110 SNOW
18 FOUNTAIN	49 RICE	80 EXAMINE	111 VOTE
19 GREEN	50 MELT	81 FEEL	112 ADVENTURER
20 CHIT	51 OTHER	82 SAFE	113 YOU
21 KILL	52 SPELL	83 AFTER	114 SHIRT
22 UNDER	53 PRESS	84 CLIMB	115 WEAR
23 WHITE	54 STUMP	85 TAKING	116 NOTE
24 TROWEL	55 PLANT	86 THAT'S	117 COIN
25 BED	56 OPEN	87 SHAFT	118 LIFE
26 POCKET	57 THEM	88 EAST	119 RAKE
27 THROW	58 PULL	89 BLUE	120 SNOWMAN
28 WINDOW	59 LISTEN	90 DROP	121 WALL
29 WITH	60 LEVER	91 THEN	122 TAKE
30 RUG	61 HOE	92 WAIT	
31 BUTTON	62 TIE	93 KRONOS	

EXPANDING YOUR ATARI

In this first article of a new series Mark Fowlis takes a general look at the various ways you can expand your Atari 400/800, XL or XE

If you are at all interested in the hardware side of computing you will, no doubt have looked through the multitude of computer interfaces, expansion modules and gadgets available at local computer stores. If I were to ask you which computer is the best for adding on these bits and pieces, which would you say? The BBC? Spectrum? Commodore?

Wrong on all counts! The Atari beats them all hands down with its Parallel Bus Interface (the rear port connector to us mere mortals), a cartridge port which can also be used or expansion, two (or in some cases four) joystick ports, which can be reprogrammed as outputs or inputs, and a serial port.

Why then, if the Atari is so great for expansions, are there such a a small number of Atari add-ons and why are those that are available so expensive? Well, there are several reasons behind this. Many of the other computers lack the features already in the Atari and need these extra add-ons to even compete, but a more significant reason is that Atari Inc. has always taken years to release any hardware details to the public and, as a result, there are hardly any expansions made for the Atari. The manufacturers can charge higher prices as there is little competition.

DO IT YOURSELF

For those owners who want to add something to their Atari, help is now at hand in the shape of this series of articles, which will teach you how to build your own add-ons at a fraction of the cost of ready-made units in the shops. This first article will take an overall look at the various expansion possibilities and later articles will go on to discuss specific projects.

If you are seriously considering expanding your Atari you will need several essential tools. These are a low power soldering iron suitable for electronics, some solder, wirecutters and metal tweezers or snipe-nose pliers. A multimeter and/or a logic probe is also invaluable. For those of you who don't have a logic probe an extremely simple circuit is provided in Figure 1. This will when connected tell you if the point probe is touching at logic level 1 (i.e. +5V), or logic 0 (i.e. 0V). These are the two basic voltages within the circuitry of most computers, except for power supplies and video circuits which do not concern us anyway. Hence for interfacing we will be using TTL (transistor-transistor logic) chips as these handle the correct levels.

Let's now take a look at each of the ports available to us.

THE JOYSTICK PORTS

These are the most widely known expansion ports on the Atari. The connections of these ports are shown in Figure 2. Pins 1-4 and 6 are normally at +5V level, and these are connected by a switch to 0v when the joystick is pushed in a direction – see Figure 3. With five push-to-make switches you can easily make an arcade-type joystick.

The PIA (or joystick) bits provide the input to one (or two in 400/800 models) 6520 PIA chip(s) read by the computer. The PIA (Peripheral Interface Adapter) can re-configure these lines to be either input (as normal) or output depending on the 'direction control register' in the chip. We can control this quite simply. Figure 4 shows the bit use of the control register(s).

The important bits are 2 and 3. Bit 3 you have probably come across before in POKE 54018 with 52 or 60 to switch the cassette motor on and off. Bit 2 controls the use of the data register. If bit 2 is high (set to 1) then any data written to the data register goes to the output and data on the inputs can be read from the data register. If bit 2 is low (set to 0) then the data register gives access to the port direction control register. For each bit (which represents an input/output line), the level determines the direction. If we put a 0 in bit 5 then line 5 will

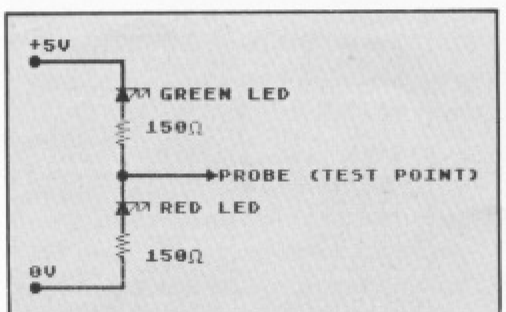


Figure 1 – Logic Probe

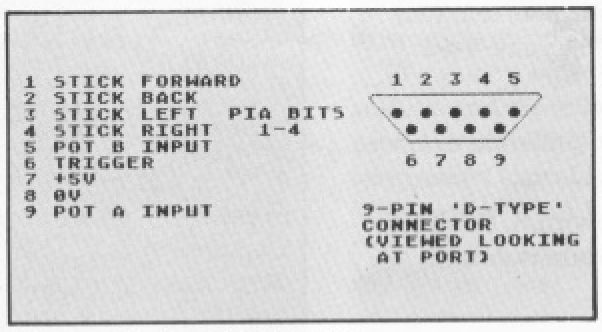


Figure 2 – Joystick Ports

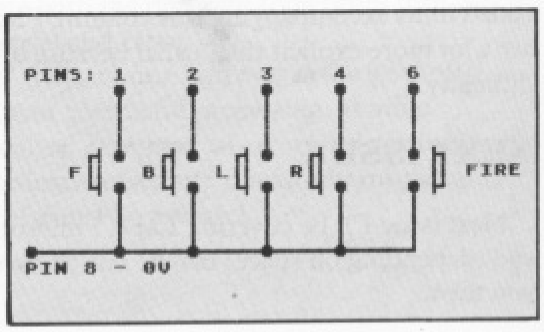


Figure 3 – Joystick Circuit

be an output. Conversely putting a 1 in a bit makes it an input. Bit 2 is then set back to 1 so that data can be read and written to the data register. Lucky 400/800 owners have two sets of these and can have 16 controllable lines. In the 600/800XL and 130XE the second PIA is used for memory control and management.

If we wish to use the port as an output we will need so kind of driver circuit as the outputs can only handle a small load. Figure 5 shows some typical driver circuits for various loads.

The limitation of the joystick ports is that they only have 10 lines for digital data, if we include the two trigger lines which are always inputs. We can therefore only have expansions using a limited number of connections. We could drive the lines to act as a serial interface for us, but this is a lot of work, mostly in writing the software, although it can be very effective.

Some sort of program must, however, be loaded in to operate any joystick port driven interface and as this program resides somewhere in memory, may be written over or ignored by other programs. As a result, you cannot guarantee that your interface will work with all commercial software (despite the claims of certain manufacturers!), and obviously you cannot use joysticks as well!

The joystick ports are also designed to accept light-pen input. These connect into port 2 (or 4 on the 400/800). Unlike other computers, the light pen circuitry can be really simple as all we need is a light sensitive switch to connect the trigger line to 0V when the electron beam of the television screen passes it. As the beam scans the screen rapidly we need a fairly fast device. Many designs have been produced before so I shall refrain from yet another light pen circuit unless there is a demand for one. The light pen X and Y screen positions are provided by the Atari in memory locations 564 and 565.

The potentiometer inputs A and B are normally used for the paddle controllers if you have any, however they can be used to read the position of other variable resistors (potentiometers), see Figure 6. This could be useful in many applications such as position sensing in robots, graphic input devices, paddles, etc.

The values are read from the following locations:

Port 1 – POT. A – 53760 ($D200)
– POT. B – 53761
Port 2 – POT. A – 53762
– POT. B – 53763 ($D203)

The 400/800 computers have yet another four inputs (53764-53767).

We can use smaller value potentiometers if we connect a capacitor from the potentiometer input line to 0V. This slows down the charging of the internal conversion capacitor, making the computer think the resistance of the external potentiometer is larger. This is a case of trial and error for individual potentiometers and is only useful if you MUST use one with a smaller value.

If the reading of the pot inputs is being done in machine code we may require some other locations:

ALLPOT – 53768 ($D208) gives the status of the converters, 1 bit representing 1 converter. A bit set to 1 means that the value of that input is valid.
POTGO – 53771 ($D20B) starts the conversion process on the inputs.

Also of interest is bit 2 of location 53775 ($D20F) which when set to 1 enables fast scanning of the inputs. This fast

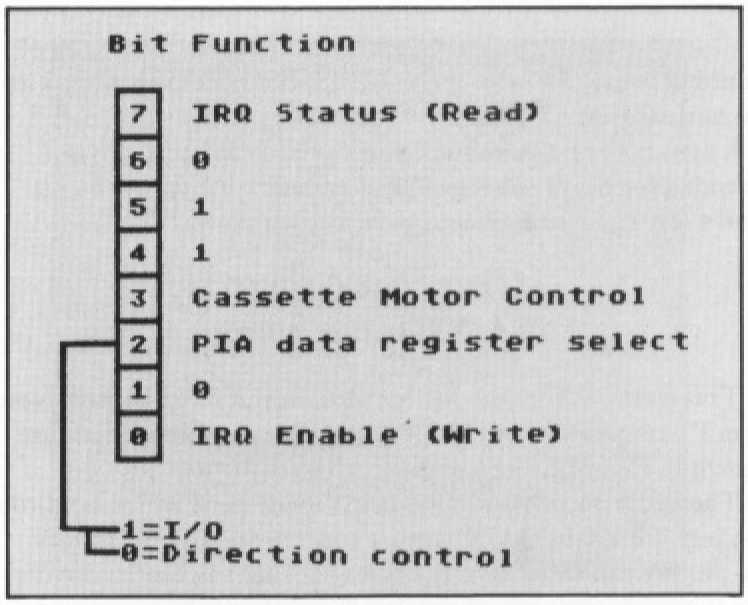


Figure 4 – PIA Control Register

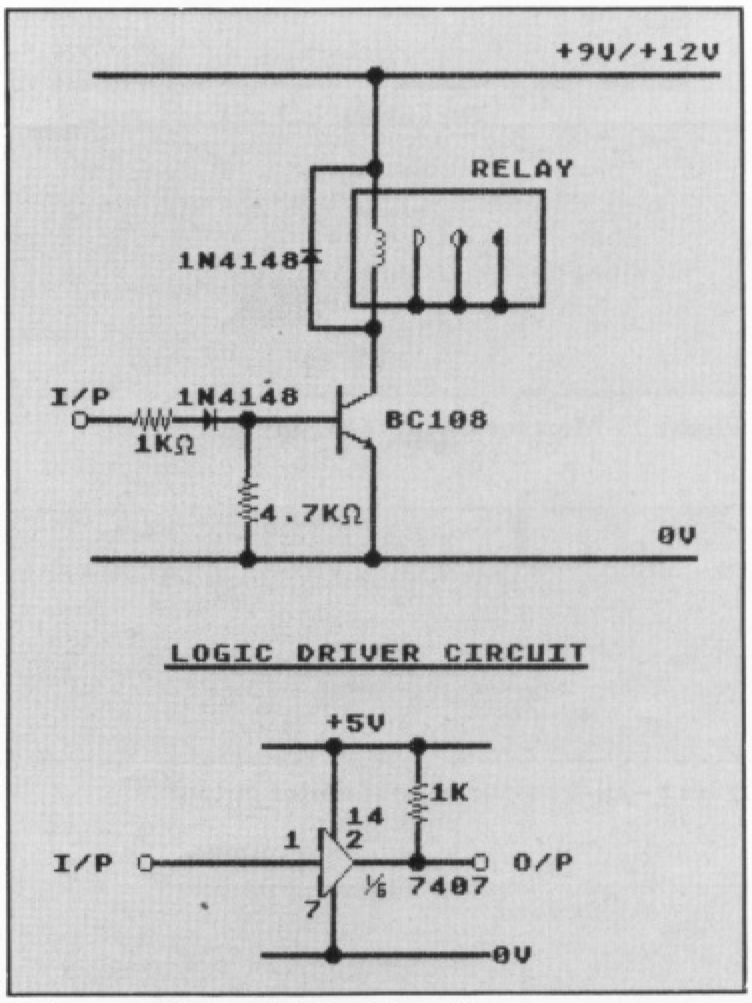


Figure 5 – Output Driver Circuits

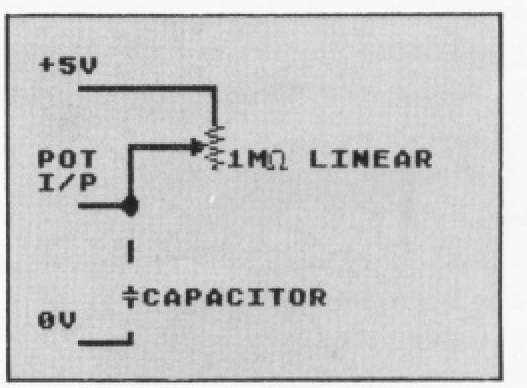


Figure 6 – Potentiometer Connections

scanning is in 2 TV scan lines (128uS) but is not as accurate as the normal scan.

A final note on the joystick ports – the +5V supply is not intended for heavy loads or lots of circuitry. Anything more than a few logic gates should have its own power supply.

MONITOR OUTPUT (XL/XE models only)

This provides the composite video output to a monitor. Note that TTL monitors will NOT work! The pin connections are shown in Figure 7.

The audio output is around 0.75V peak-peak which is a little too high for Hi-Fi 'AUX' inputs which want around 150mV pk-pk. We can step down the voltage using a potential divider – see Figure 8. Now you should be able to have Hi-Fi sound from your Atari! Check the input levels to your Hi-Fi first though, R1 may need to be larger if the input level is less than 150mV.

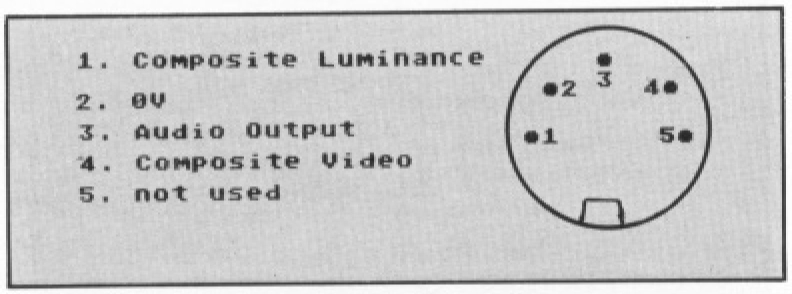


Figure 7 – Monitor Output (XL/XE only)

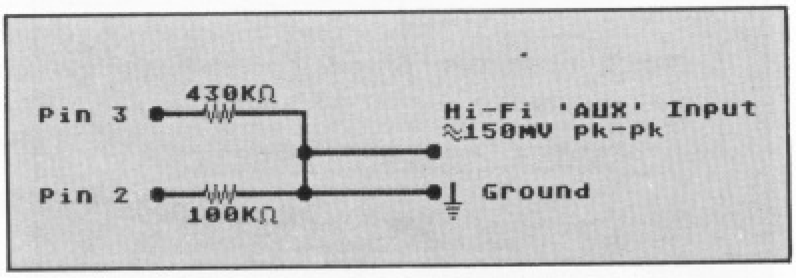


Figure 8 – Hi-Fi input from monitor output

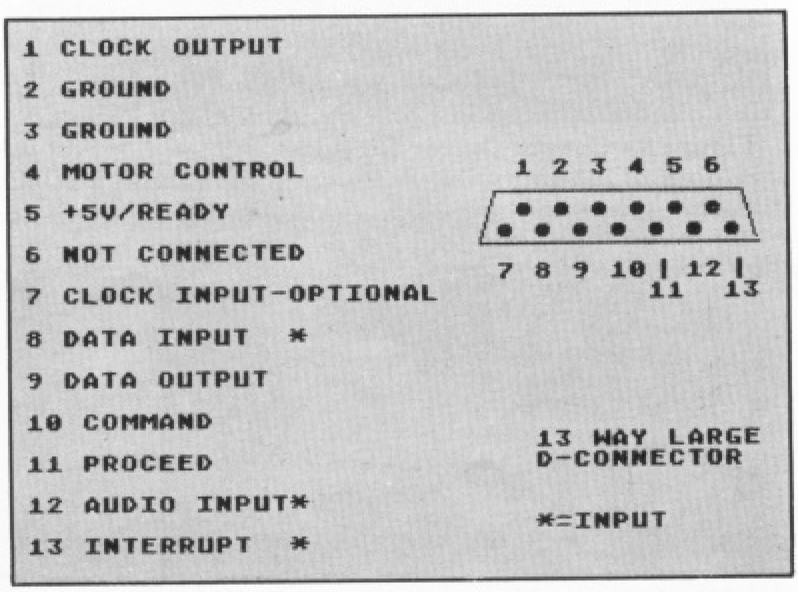


Figure 9 – The Serial Port

THE SERIAL PORT

This is pretty difficult to use unless you intend using a computer at the other end to decode the signals and send the appropriate reply codes. As you can daisy chain a number of devices, each data message has a device address encoded and the destination must acknowledge each frame from the computer. Personally I would not advise expanding via the serial port as it is too complex and not particularly fast. Also any driving software must handle the device by the standard SIO calls. For the interested, the pin connections are in Figure 9 and a good description of the operation can be found in the 400/800 reference manual available from Atari.

THE CARTRIDGE PORT

Although predominantly used for ROM cartridges, the cartridge port is an extremely useful expansion port giving us a 16K block of memory for registers and I/O. The pin assignment is shown in Figure 10 and includes:

* Address lines A0 to A12 (8K coverage)
* Data Bus (D0 to D7)
* R/$\overline{W}$ – Read/$\overline{\text{Write}}$
* S4 – Right slot ROM select line. ($8000 – $9FFF).
* $\overline{\text{S5}}$ – Left slot ROm select line. ($A000 – $BFFF).
* RD4 – Right ROM present. (+5V if it is)
* RD5 – Left ROM present. (+5V if it is)
* 02 – System clock.
* $\overline{\text{CCTNL}}$' – ROM Bank Control select line: driven by any R/$\overline{W}$ to $D5000 to $D5FF. Used to select 1 of 2 ROMS in the area selected. (Supercartridges).

We can fit 32K of ROM into a cartridge and select between two banks of 16K in the available space ($8000 to $BFFF). The only difference with using the cartridge port is that you must use cassette or disk based languages as the cartridge expansion will occupy the cartridge area, hence the Assembler/Editor cartridge cannot be used! We can however write our programs before and convert them to Basic DATA statements for loading by the inbuilt Basic.

To connect to this port you will need a 15 way double sided edge card of 0.1 inch spacing contacts to plug into the slot. This could then be connected to a card frame for further expansion. Alternatively for a chosen application with a small number of components a 'cartridge' could be made on a double-sided p.c.b.

To interface to the cartridge port we must, in most cases, make use of the right hand slot (i.e. $8000 to $9FFF) as the left hand slot ($A000 to $BFFF) is occupied by Basic. If we are using a purpose written machine code boot program, however, we could use either or both halves.

THE PARALLEL BUS INTERFACE (XL/XE only)

One of the greatest mysteries of the newest range of Atari computers is the rear expansion port. Hardly anyone seems to know how to use it, and there have been a small number of slightly confusing articles. Adverts too, manage to confuse the

use of the port. We shall now set history straight (I hope!).

The port presents us with the full address bus of the computer A0 to A15, allowing observation of any memory location – see Figure 11. The data bus is also present. Read/Write and the system clock are provided too. Where this port really starts to differ is in the extra useful lines ....

CAS - Column Address Strobe, output for RAM addressing.
RAS - Row Address Strobe, output for the same.
AUDIO - Audio input allowing you to have sound feeding through your T.V./monitor speaker.
RESET - Output, to reset any expansions on power-up etc.
REFRESH - Refresh timing output.
MPD - Math Pack Disable Input. Disables Floating point ROM ($D800 to $DFFF) for parallel bus interfaces.
IRQ - Interrupt request input.
READY - Ready input. Used for slow memory devices.
EXTENB - External decoder output for PBI devices. If you want to use the expansion for callable devices such as disk drives then you need this.
EXTSEL - Input to disable internal RAM, to allow input. This is VERY useful ...

Note that there is NO way of disabling the operating system from the port. Some recent expansion units claim to be expandable to allow multiple Operating Systems via the rear port, however these will need internal modification of the host computer thus invalidating your guarantee.

There are two ways of using the parallel bus interface. Firstly, as Atari intended, it may be used as a device. This could then be handled by the standard calls such as LIST "P:" etc. However this requires a 2K device handler ROM to overlay the floating point ROM. It might just be a little over the top if we want a simple I/O port and don't really want to spend time programming 2K ROM's and writing device handlers! Secondly, you can use it, as it probably will be used in nearly all cases, as a powerful expansion port.

130XE owners may well be getting worried by now. Where is the massive expansion port I am talking about? Apparently Atari were not too happy that very few products had been released to use the rear port on the 600/800XL, so they simplified it to a 'cartridge port expander'. Not one of the cleverest moves for, as in the cartridge port, you cannot use a cartridge and a rear port expansion! So for 130XE owners, the same rules apply as for the cartridge port.

COMING NEXT

That's the overview of the expansion possibilities. I hope that it has whetted your appetite. Next issue I'll be revealing the details of the 130XE cartridge port expander (the equivalent of the rear expansion port) as well as the 400/800 rear expansion bus (Atari's biggest secret!). Also I'll be showing how to use the rear expansion port to connect to a multitude of projects.

WARNING: *Unless you are absolutely sure you know what you are doing it is possible to damage your computer when attaching any expansion circuits. Neither the author nor PAGE 6 can accept any responsibility for any damage resulting from any project undertaken as the result of suggestions made in this series.*

	S4	1	A	* RD4	
	A3	2	B	0V	
	A2	3	C	A4	
	A1	4	D	A5	
	A0	5	E	A6	
	D4	6	F	A7	
	D5	7	H	A8	
REAR	D2	8	J	A9	FRONT
	D1	9	K	A12	Top on 130XE
	D0	10	L	D3	
	D6	11	M	D7	
	S5	12	N	A11	
	+5V	13	P	A10	
	RD5 *	14	R	R/W	
	CCNTL	15	S	CLK2 (02)	

*=INPUT

Figure 10 – The Cartridge Port

	0V	1	2	* EXTSEL	
	A0	3	4	A1	
	A2	5	6	A3	
	A4	7	8	A5	
	A6	9	10	0V	
	A7	11	12	A8	
	A9	13	14	A10	
	A11	15	16	A12	
	A13	17	18	A14	
	0V	19	20	A15	
	D0	21	22	D1	
	D2	23	24	D3	
	D4	25	26	D5	
TOP	D6	27	28	D7	BOTTOM
	0V	29	30	0V	
	CLK2 (02)	31	32	0V	
	..	33	34	RST	
	IRQ *	35	36	* RDY	
	..	37	38	EXTENB	
	..	39	40	REFRESH	
	CAS	41	42	0V	
	MPD *	43	44	RAS	
	0V	45	46	READ/WRITE	
	..	47	48	..	
	AUDIO *	49	50	0V	

* = Input
.. = Reserved
‾ = pin is active low

Figure 11 – The Rear Expansion Port (600/800XL)

10-PRINT
XLENT Software
£14.95

For many years 1029 printer owners have been crying out for a useful utility to use with their 'neglected' peripheral. Support for it now comes from XLENT software, in what they describe as 'THE ULTIMATE UTILITY FOR THE 1029 PRINTER'. 10-Print comes as a double-sided disk, with several fonts and accessory programs and a small, but interesting, manual. The disk itself had a minor 'defect' in the fact that it only has DOS 2.0 and not the more commonly used DOS 2.5.

A NEW DEVICE HANDLER

On loading, 10-Print installs a device, Q:, into the handler address table, and then loads the rest of the program into page 24 of memory. The big downfall of this is that when DOS is called, DUP.SYS automatically overwrites the Q: handler and the only way of getting it back is to re-boot. As 10-Print appears to only occupy 1K of memory, I cannot understand why the author couldn't have bumped up MEMLO a little, to accommodate both DOS and the Q: handler. A solution to this fault can be obtained by using the CUSTOM.BAS program that is on the disk. This gives the user the chance to relocate the program anywhere in memory.

IN USE

To the user who just wants a hard copy of a program listing, 10-Print operates in exactly the same way as the LIST "P:" command, except that you use Q: instead. The normal printer output using this manner is 60 characters per line, but by using LIST "Q2:" the printer lists in 38 characters per line, as in a default GRAPHICS 0 screen. The devices Q3: and Q4: also exist, these modes print in the same way as Q1: and Q2: except that characters are 8 lines high, so as to reproduce characters as shown on screen, but these modes take two passes to complete each line and so take twice as long to complete the listing. The actual output to the printer deserves a good comment as 10-Print does not use the 1029's built in character set, but the one that the computer is using at the time of printing!

Programs using the Q: handler can be easily written in BASIC, as the handler is compatible with all the usual OPEN, PRINT # and PUT # commands, and P: can also be OPEN on a different channel, enabling the printer's standard font to be mixed with the character set that the computer is currently using. This is a fantastic feature, that will allow you, by simple software control, to print in any style of font that is currently resident in memory.

Spacing and the number of characters per line can be altered by POKEing a memory location, CHRWID and NUMCHS respectively, though Q2: and Q4: will always print 38 characters per line. This gives access to narrower characters and with a special font that fits into 4 columns per character, it will allow 120 characters per line. Although some readability is lost by doing this, it is ideal for applications such as printing a lot of text on labels or for database/spreadsheet output.

```
(0) This is six.fnt
(1) This is bold6.fnt
(2) This is four.fnt
(3) This is block.fnt
(4) This is square.fnt
(5) This is cursive.fnt
(6) This is atari.fnt
(7) This is standard 1029
(8) This is standard 1029 underlined
<9> This is 1029 double width
<:> This is 1029 double width, underlined

These are the 11 modes used by FILEPRNT.BAS.
```

Reviewed by Phil Cardwell

APPLICATIONS

10-Print appears to be a stand alone utility for the 1029, in the way of providing better quality listings, but as it is an AUTORUN.SYS file, how can it be used with a word processor that also auto boots? After a short consultation with the manual, I discovered that if a word processor file is printed to disk, as it would appear on paper with indentations, margins etc., there is a program called FILEPRNT on the disk which allows WP files to be printed. The program does not work properly as it is and requires some 'cosmetic' programming, which the vast majority of users should get round with ease. Once it has been set to the users requirements, FILEPRNT will automatically select different fonts to be printed within the document currently being processed, providing that you have embedded 3 special font selection codes within your text.

Another program on the disk, TYPESET, gives limited compatibility with TYPESETTER files. Limited because it only allows part of a TYPESETTER file to be printed. Advanced programmers should be able to come up with a routine to print the whole file.

By studying the BASIC programs included on the disk, practically anyone can be capable of writing a routine to suit their problem. People who follow this advice will notice that the GRAPHICS 8 screen dump and TYPESET programs, don't even need the Q: handler to be resident in memory!

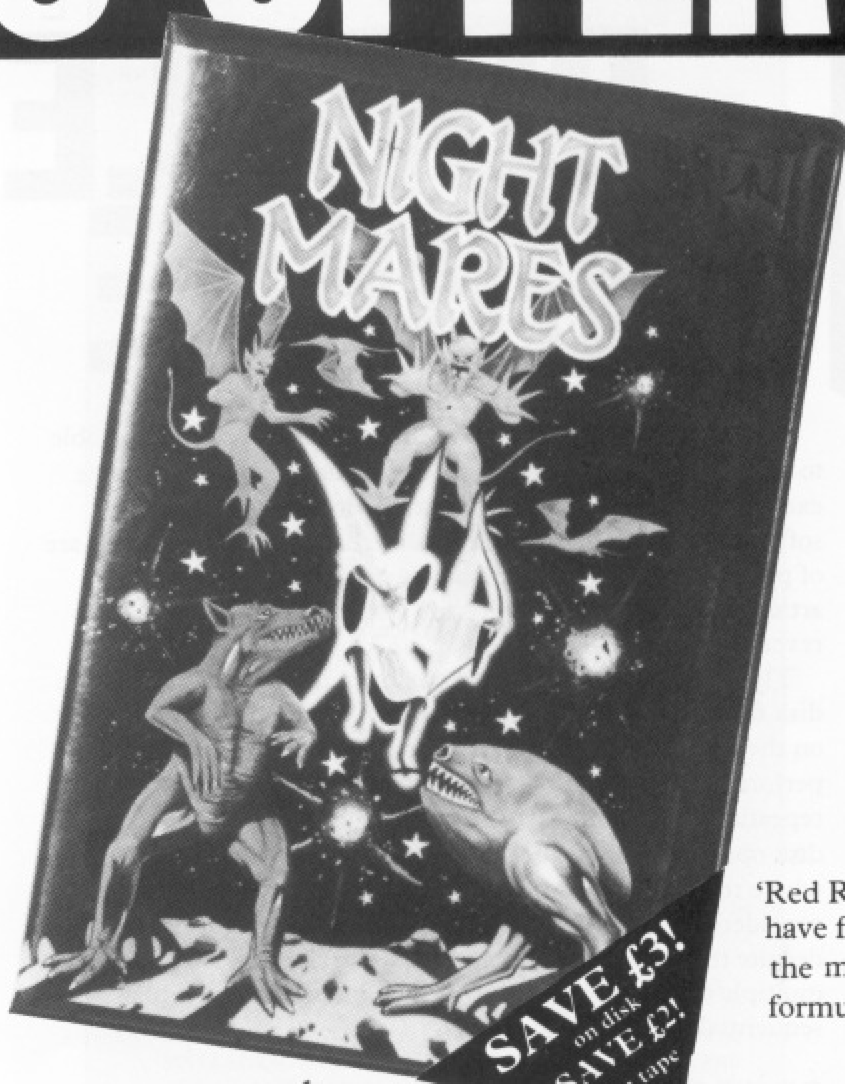
CONCLUSIONS

10-Print, despite the occasional minor 'bug', is a very flexible and powerful utility, which many 1029 owners should have installed before any programming session. It's main value lies in it's capabilities to produce listings that contain control, graphic and inverse characters, but it is extremely useful for enhancing the appearance of any text based output.

It may not be the 'ultimate 1029 utility' but it is possibly the only one that can contend for the title and is well worth considering, if you want to improve the appearance of different forms of textual output on your 1029.

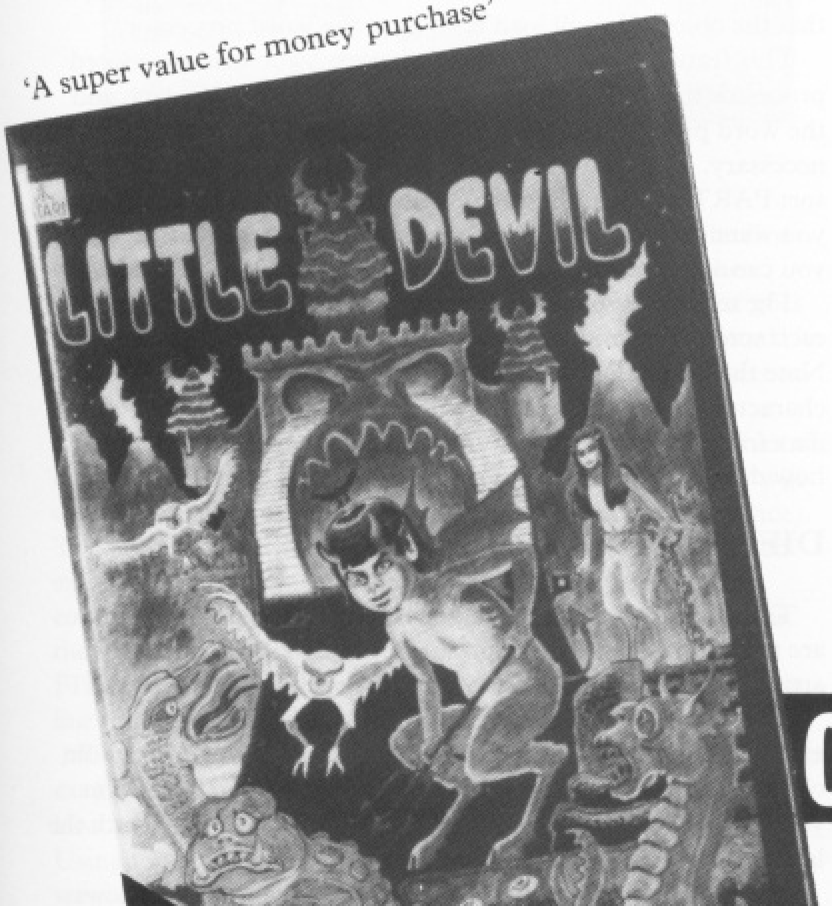
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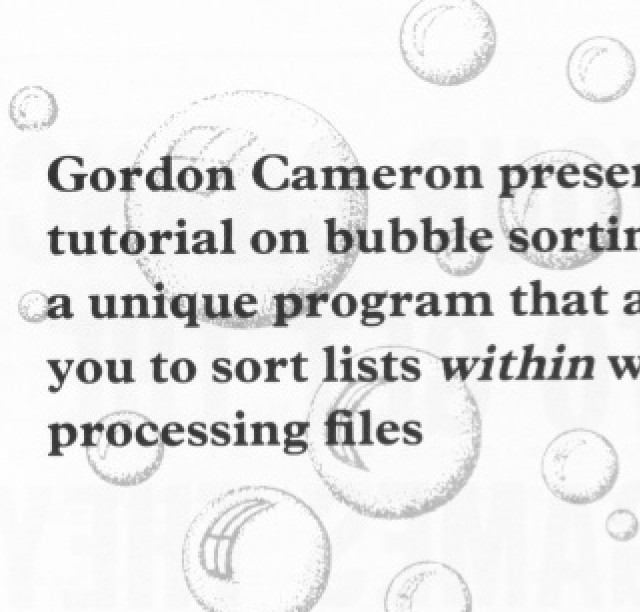
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BUBBLE BUBBLE



Gordon Cameron presents a tutorial on bubble sorting with a unique program that allows you to sort lists *within* word processing files

There are many occasions when it would be useful to be able to sort data into either numerical or alphabetical order. Some examples are Telephone Directories, Book/Record lists, software lists etc. Many such files are held on disk and these are of particular interest as they can be easily manipulated. This article will deal with sorting a file into either alphabetical or reverse alphabetical order.

There are two main ways of performing sorts of this kind on disk files (which are usually text files). One is to do operations on the file itself, reading it in a couple of lines at a time say, performing an operation, writing the results to another file, and repeating the procedure over and over but this involves a lot of disk operations. One alternative would be to use a RAMDISK, where the text files could be stored. This increases the speed considerably and, obviously, eliminates disk operation but, despite this, the method is cumbersome and clumsy involving multiple opening and closing of files and only allowing sequential indexing of data.

SORT IN MEMORY FOR SPEED

The method I will use involves copying the source file into memory, in this case into an array, and sorting the data in the array. Finally, the resultant sorted array can be saved to an object file.

Before going on I had better explain some terms before I lose anyone. The source file is the original unsorted file which you wish to sort and the object file will be the file AFTER it has been sorted. A text file is a file which consists of characters usually produced by a word processor or text editor etc. and which can be loaded using either the INPUT or GET commands, depending on the format.

The source file need not be a word-processor file. If you are, for example, writing a software list program, you may save your file directly to disk using either PUT or PRINT. These files can just as easily be sorted using the methods I describe below.

SORTING WORD PROCESSED TEXT

Firstly, we must read the file into the array. The program required is shown in Listing 1. Line 10 dimensions the array FILE$ to hold 10000 characters. This may not be enough or it may be too much for your needs so alter it as you like. 10000 is, however, a good round number to be getting on with. The source text file may have been saved with either PRINT or PUT. The program deals with this, and reads the data into the string FILE$. This may take a while. The program is fairly unique in that it can sort just part of a text file so that lists forming part of a document can be sorted. This facility is often missing from many commercial word processors.

It is important that you mark the beginning and end of the data that you wish to be sorted. Mark the beginning with a '$' symbol followed by RETURN on a separate line. Mark the end of the data with the 'up arrow' symbol, again on a line by itself. The data in between these two markers will be the data that is manipulated and sorted. Anything before is stored in GARBST$, and anything after in GARBEND$. This facility is provided as many word processors (e.g. Superscript, Mini Office II) add their own control characters to the beginning and/or end of your actual text. Using this method we retain these special codes but they are obviously not to be sorted. They are rewritten to the object file at the end of the session, so that the object file will load back in to the word processor.

This feature is very valuable as it means you can use a word processor to enter data, the program here to sort the data, and the word processor thereafter to inspect and adjust again if necessary. The above feature is also useful if you only want to sort PART of a file. Simply position the markers round the part you want sorted, and the program will handle the rest. Again, you can alter the sizes of GARBST$ and GARBEND$ at will.

The text to be sorted is stored sequentially in the array, with each screen line of the file occupying 40 spaces in the array. Note this limitation which means that data longer than 40 characters cannot be sorted by this program. Once we have the data from the file in memory we can access any line at will but how do we sort this data ?

DIFFERENT TYPES OF SORT

There are several sorting algorithms but the most common are the Bubble sort, Shell sort and the Quick sort. For this article I will look at the easiest of the three, the Bubble sort.

The best way to explain the sort is by way of a simple example. Only 6 'lines' of data will be used but the method can obviously be extended to much larger files. Listing 2 will sort your data. This program should be used in conjunction with the loader given in Listing 1.

The data in our example is a list of software titles as follows:

Line 1 – Kennedy Approach
Line 2 – Pawn
Line 3 – Star Raiders
Line 4 – Phantom
Line 5 – Summer Games
Line 6 – Decathlon

Listing 2

```
PW 1000 REM *****************************
BD 1010 REM *     BUBBLE SORT MODULE     *
ZQ 1020 REM *            by              *
PI 1030 REM *       Gordon Cameron       *
IV 1040 REM *----------------------------*
PF 1050 REM * PAGE 6 MAGAZINE - ENGLAND*
QO 1060 REM *****************************
IS 1061 REM
FZ 1065 DIM LINE1$(40),LINE2$(40)
YH 1070 ? "KBubble Sort":? :? "(F)orward
    or (B)ack Alpha sort ?"
GO 1072 OPEN #3,4,0,"K:"
JP 1074 GET #3,KEY:IF KEY<>ASC("F") AND K
    EY<>ASC("B") THEN 1074
TB 1075 CLOSE #3:IF KEY=ASC("F") THEN FRW
    ARD=1:BACK=0:? "FORWARD SORT..":GOTO 2
    000
AE 1080 FRWARD=0:BACK=1:? "BACKWARDS SORT
    .."
HG 1090 REM **** COMMENCE THE SORT ****
PT 2000 ? :? "Total of ";LINE;" lines to
    sort..":?
BC 2005 FOR LOOP=LINE-1 TO 1 STEP -1:SWAP
    FLAG=0
JI 2010 FOR LOOP2=1 TO LOOP
GI 2020 PRINT "Pass ";LINE-LOOP;".";LOOP2
RI 2030 LINE1$=FILE$((LOOP2-1)*40+1,LOOP2
    *40)
QI 2040 LINE2$=FILE$(LOOP2*40+1,(LOOP2+1)
    *40)
SD 2050 IF FRWARD AND LINE1$>LINE2$ THEN
    GOSUB 3000
BE 2060 IF BACK AND LINE1$<LINE2$ THEN GO
    SUB 3000
YP 2070 NEXT LOOP2
KT 2080 IF  NOT SWAPFLAG THEN 2095
ET 2085 PRINT "No. of swaps = ";SWAPFLAG
VZ 2090 NEXT LOOP
IG 2095 ? "SORT FINISHED !":GOTO 5000
VO 2099 REM ****** SWAP TWO VALUES ******
XF 3000 SWAPFLAG=SWAPFLAG+1
MB 3010 FILE$((LOOP2-1)*40+1,LOOP2*40)=LI
    NE2$
JQ 3020 FILE$(LOOP2*40+1,(LOOP2+1)*40)=LI
    NE1$
WS 3030 LINE1$="":LINE2$=""
AN 3040 RETURN
ZQ 5000 REM **** END OF SORT -WRITE
             TO DISK **************
JN 5010 ? "WRITING TO DISK...PLEASE WAIT"
```

The bubble sort works through the list checking if the first line of data is greater than (in this case, 'higher up' in the alphabet) the next line. If it is, it swaps them otherwise it goes on to the next item. If a reverse alphabetical sort is required then we simply check if the first item is LESS than the second and again swap them if so.

This swapping continues down the 'list' of lines and when the end is reached the last line will be correct (i.e. the last line will contain the 'greatest' or highest in the alphabet text sequence). The procedure is then repeated with each line being checked excluding the last line as it is correct. This is repeated continually until all the values are correctly placed. Note that the first line is contained in FILE$(1, 40), the second in FILE$(41, 80), the third in FILE$(81, 120) and so on so each line in the list must consist of a maximum of 40 characters only.

The Atari can work out with its inbuilt functions whether, for example, 'Phantom' > 'Summer Games' or not, so you don't have to bother with this. Your Atari does this part for you. Using the above algorithm the data transforms in the following way:

Pass 1. 1
Is Kennedy Approach (line 1) > Pawn (line 2)?
No, so don't swap

Continued overleaf

Listing 1

```
QK 1 REM *****************************
GL 2 REM *     FILE ENTRY PROGRAM     *
ZB 3 REM *            by              *
FO 4 REM *       Gordon Cameron       *
DZ 5 REM *----------------------------*
RK 6 REM * PAGE 6 MAGAZINE - ENGLAND *
QQ 7 REM *****************************
NN 8 REM
AH 10 DIM FILE$(10000),NAMEIN$(14),NAMEOU
   T$(14),GARBST$(1000),GARBEND$(1000),TE
   MP$(40)
PT 15 FILE$=" ":GARBST$="":GARBEND$="":CO
   UNT1=1:COUNT2=2:NUM=1:LINE=1:FLAG=0
KU 20 GRAPHICS 0:POKE 752,1:POKE 82,0
JD 25 ? "K":COLOR 160:PLOT 1,2:DRAWTO 38,
   2:DRAWTO 38,21:DRAWTO 1,21:DRAWTO 1,1
LZ 30 POSITION 6,6:? "Please enter source
    filename":POSITION 3,7:? "Please incl
   ude identifier(e.g D1:)":POSITION 8,8
KG 35 INPUT NAMEIN$
YS 40 POSITION 6,11:? "Please enter sourc
   e filename":POSITION 3,12:? "Please in
   clude identifier(e.g D1:)"
UQ 45 POSITION 8,13:INPUT NAMEOUT$
LR 50 PLOT 1,1
DR 100 REM ** ENTER FILE USING GET **
KM 110 TRAP 300
AQ 120 OPEN #1,4,0,NAMEIN$
SH 121 REM ** READ IN START GARBAGE *
RR 123 GET #1,GARBST
DV 124 GARBST$(COUNT1)=CHR$(GARBST):COUNT
   1=COUNT1+1
BT 125 IF GARBST<>36 THEN 123
VZ 126 REM **** READ IN FILE TO *****
          ******** BE SORTED ********
LK 127 GET #1,DUMMY:FLAG=1
CQ 128 REM *** NUM IS THE POSITION ALONG
   THE LINE - LINE IS THE LINE NO. *****
OT 129 POSITION 13,18:? "Reading line 1"
RD 130 GET #1,CHAR
WV 135 IF CHAR=ASC("^") THEN GARBEND$(1)=
   "^":GOTO 200
FV 140 IF CHAR=155 OR NUM=40 THEN 150
TV 145 FILE$((LINE-1)*40+NUM)=CHR$(CHAR):
   NUM=NUM+1:GOTO 130
EY 150 FILE$((LINE-1)*40+NUM)=CHR$(155):N
   UM=1:LINE=LINE+1:POSITION 26,18:? LINE
   :GOTO 130
PY 200 REM *** READ IN END GARBAGE ***
RP 215 GET #1,CHAR
UK 220 GARBEND$(COUNT2)=CHR$(CHAR):COUNT2
   =COUNT2+1
OQ 230 GOTO 215
PP 300 REM ** ALL ERRORS TRAPPED TO HERE
   **
HH 310 IF  NOT FLAG THEN ? "KNO FILE MARK
   ED TO SORT !!":END
IF 320 LINE=LINE-1
AR 330 REM *** PAD OUT THE LAST LINE TO
VG 331 REM *** FILL 40 CHARACTERS ....
TL 335 LASTLINE=(LINE-1)*40+1
NM 340 LOOP=LASTLINE
KP 350 IF ASC(FILE$(LOOP,LOOP))<>155 THEN
    LOOP=LOOP+1:GOTO 350
WM 360 IF (LOOP-LASTLINE)<39 THEN FILE$(L
   ASTLINE+39)=" "
RC 370 REM
PP 380 REM ** NOW LAST LINE CONSISTS OF 4
   0
XO 385 REM ** CHARACTERS
DE 999 REM * PASS CONTROL TO SORTER MODUL
   E
NK 9000 REM ***** WRITE OUT THE OBJECT **
   *
QL 9005 OPEN #2,8,0,NAMEOUT$
LS 9010 FOR A=1 TO COUNT1-1
HK 9020 CHAR=ASC(GARBST$(A,A))
GT 9030 PUT #2,CHAR
BZ 9040 NEXT A
JA 9045 PUT #2,155
PX 9050 FOR B=1 TO LINE
VH 9055 C=1
LZ 9060 CHAR=ASC(FILE$((B-1)*40+C))
HF 9070 PUT #2,CHAR
GZ 9080 IF CHAR<>155 THEN C=C+1:GOTO 9060
CZ 9090 NEXT B
NR 9100 FOR D=1 TO COUNT2-1
NZ 9110 CHAR=ASC(GARBEND$(D,D))
GS 9120 PUT #2,CHAR
DF 9130 NEXT D
LH 9200 ? "KFINISHED !...."
HG 9210 CLOSE #1:CLOSE #2:POKE 752,0:END
```

Pass 1. 2
Is Pawn (line 2) > Star Raiders (line 3)?
No, so continue

Pass 1. 3
Is Star Raiders (line 3) > Phantom (line 4)?
YES! So swap. Phantom which was line 4 now becomes line 3 and Star Raiders becomes line 4

This continues with Star Raiders being compared with Summer Games – no swap occurs. Summer Games is greater than Decathlon so a swap occurs and the list after the first pass is as follows:

BEFORE		AFTER
Line 1	Kennedy Approach	Line 1
Line 2	Pawn	Line 2
Line 4	Phantom	Line 3
Line 3	Star Raiders	Line 4
Line 6	Decathlon	Line 5
Line 5	Summer Games	Line 6

Note that Summer Games has taken its proper position at the bottom of the list, as it is the 'highest in the alphabet' so in the next pass, we don't need to check this line with the previous one as we KNOW that it is correct. Whereas before we had to make 5 comparisons (1 with 2, 2 with 3, 3 with 4, 4 with 5 and 5 with 6), next time we need only make 4 comparisons as we don't need to compare with the last line.

In the next pass, only one swap occurs, that of Decathlon with Star Raiders. In pass 3 there is again only one swap – Decathlon with Phantom and in pass 4 only one swap again – Decathlon with Pawn. In pass 5, Decathlon is swapped with Kennedy Approach and this yields the final-sorted sequence:

AT START		END
Line 6	Decathlon	Line 1
Line 1	Kennedy Approach	Line 2
Line 2	Pawn	Line 3
Line 4	Phantom	Line 4
Line 3	Star Raiders	Line 5
Line 5	Summer Games	Line 6

And that's the bubble sort for you!

SIMPLE BUT EFFECTIVE

The Bubble sort is very simple, but it can be very effective, however there are drawbacks. Notice that, although Summer Games reached its location almost at once, Decathlon took 5 swaps and all 5 Passes and therefore reached its destination very slowly. This demonstrates a possible disadvantage of the Bubble Sort – although only one item was out of place, it took many swaps to get it to its destination. Imagine the list being hundreds of lines long with, say, 'AAA' right at the bottom and all other lines in sorted order. What a waste! If there were 500 lines, it would take 499 passes and swaps just to get this line to its correct position!

Although an extreme example, this demonstrates the shortcomings of the bubble sort algorithm but there are alternatives. In a later article I will show you the Shell sort. Bye for now!

EASY PLAYER MISSILE GRAPHICS

This issue we have a listing showing how easy it is to move Player/Missiles using the Turbo Basic commands MOVE and -MOVE. Just type in the listing using TURBO BASIC and RUN it. When you hear a beep, type in any message up to 26 characters long.

The program uses fairly standard Player Missile Graphics which have been explained in several other articles so I will only run through the commands used which are unique to TURBO BASIC.

Line 140: This line places zeroes in the player missile area, I used 20000 by trial and error to find an area of 2K which was not being used and therefore full of zeroes.
Lines 205-230: This moves the character data from the character set in ROM to the player 0 area. The data at the end of the program is in ATASCII character codes, you have to subtract 32 from this because the first character stored in the set is SPACE (ATASCII 32).
Line 245: Moves player 0 down.
Line 255: This takes the bottom byte and moves it to the top, which allows the player to scroll around the screen.
Lines 340-380: This uses REPEAT-UNTIL loops to move player 1 from left to right.
Lines 440-480: I have used WHILE-WEND loops to show the difference to REPEAT-UNTIL. In this case either can be used, but normally one of these would suit the job better.
Lines 520-555: Gets the characters typed in and places them in player 3. I have used an IF-ELSE-ENDIF to show how this can be used.
PROC MOVE: This is an endless loop with all the movements for all four players together. These are the only lines you need to actually move the players depending on which direction you want to go.

I hope this listing will give you the courage to use Player/Missiles in your Turbo BASIC programs, without having to worry about machine code.

by Roy Goring

TURBO BASIC

```
OK 1 REM ******************************
KN 2 REM *    PLAYER-MISSILE DEMO     *
FA 3 REM *            by              *
LX 4 REM *         ROY GORING         *
DZ 5 REM *----------------------------*
RK 6 REM * PAGE 6 MAGAZINE - ENGLAND *
QQ 7 REM ******************************
NN 8 REM
DI 9 ------------------------------
MQ 10 GO# MAIN_PROG
IW 99 ------------------------------
ZH 100 PROC INITIALISE
EZ 110   GRAPHICS 3+16
DK 120   PMADR=PEEK(106)-16:PMBASE=PMADR*
   256:POKE 54279,PMADR:POKE 106,PMADR
FO 130   POKE 559,62:POKE 53277,3
QX 140   MOVE 20000,PMBASE,2048
AS 150   FOR A=0 TO 3:POKE 53248+A,0:NEXT
    A
LL 160   CHBASE=57344:POKE 704,202:POKE 7
   05,90:POKE 706,138:POKE 707,26
VX 170 ENDPROC
QH 199 ------------------------------
QU 200 PROC PLAYER0
FQ 205   C=0
LC 210   FOR A=0 TO 15
VY 215     READ D:D=D-32
YD 220     MOVE CHBASE+(D*8),PMBASE+1050+
   C,8
PR 225     C=C+8
WK 230   NEXT A
UX 235   POKE 53248,60
XR 240   FOR E=1 TO 230
CB 245     -MOVE PMBASE+1024,PMBASE+1024+
   1,256
VL 250     PAUSE 1
LF 255     MOVE PMBASE+1270,PMBASE+1040,1
YM 260   NEXT E
WL 265 ENDPROC
QI 299 ------------------------------
RL 300 PROC PLAYER1
FR 305   C=0
JR 310   FOR A=0 TO 13
VZ 315     READ D:D=D-32
DV 320     MOVE CHBASE+(D*8),PMBASE+1306+
   C,8
PS 325     C=C+8
WL 330   NEXT A
LO 335   X=0
LU 340   REPEAT
PO 345     POKE 53249,X:X=X+1
VM 350     PAUSE 1
QO 355   UNTIL X=255
LF 360   X=0
MN 365   REPEAT
PF 370     POKE 53249,X:X=X+1
WF 375     PAUSE 1
JH 380   UNTIL X=100
WQ 385 ENDPROC
QJ 399 ------------------------------
SC 400 PROC PLAYER2
FS 405   C=0
KL 410   FOR A=0 TO 14
WA 415     READ D:D=D-32
JE 420     MOVE CHBASE+(D*8),PMBASE+1562+
   C,8
PT 425     C=C+8
WM 430   NEXT A
AN 435   X1=255
KP 440   WHILE X1<>0
TO 445     POKE 53250,X1:X1=X1-1
VN 450     PAUSE 1
YM 455   WEND
AE 460   X1=255
FB 465   WHILE X1<>140
TF 470     POKE 53250,X1:X1=X1-1
WG 475     PAUSE 1
YD 480   WEND
WR 485 ENDPROC
QK 499 ------------------------------
ST 500 PROC PLAYER3
CV 505   SOUND 0,10,12,15:PAUSE 5:SOUND
XR 510   POKE 53251,180:C=0
RD 515   # LABEL1
EX 520   GET D:D=D-32
CB 525   IF D=155-32 OR C>207
GV 530     GO# LABEL2
XU 535   ELSE
FA 540     MOVE CHBASE+(D*8),PMBASE+1820+
   C,8
PY 545     C=C+8
GH 550     GO# LABEL1
YN 555   ENDIF
RM 560   # LABEL2
YN 565   FOR E=1 TO 230
OO 570     MOVE PMBASE+1792,PMBASE+1792-1
   ,256
WH 575     PAUSE 1
BG 580     MOVE PMBASE+1816,PMBASE+2047,1
ZI 585   NEXT E
WF 590 ENDPROC
QL 599 ------------------------------
GT 600 PROC MOVE
UZ 605   DO
BK 610     -MOVE PMBASE+1024,PMBASE+1024+
   1,256
LB 615     MOVE PMBASE+1270,PMBASE+1040,1
OY 620     POKE 53249,X:X=X+1
DC 625     IF X=255 THEN X=0
SZ 630     POKE 53250,X1:X1=X1-1
ZK 635     IF X1=0 THEN X1=255
OJ 640     MOVE PMBASE+1792,PMBASE+1792-1
   ,256
BO 645     MOVE PMBASE+1816,PMBASE+2047,1
DB 650   LOOP
WN 655 ENDPROC
AF 1999 ------------------------------
BY 2000 # MAIN_PROG
TW 2010 EXEC INITIALISE
CH 2020 EXEC PLAYER0
DB 2030 EXEC PLAYER1
DV 2040 EXEC PLAYER2
EP 2050 EXEC PLAYER3
KY 2060 EXEC MOVE
AG 2999 ------------------------------
ZB 3000 DATA 84,72,73,83,32,73,83,32,65,3
   2,83,80,82,73,84,69
NZ 3010 DATA 65,78,79,84,72,69,82,32,83,8
   0,82,73,84,69
PZ 3020 DATA 72,69,82,69,32,73,83,32,65,3
   2,84,72,78,82,68
```

CAN YOU WRITE TURBO PROGRAMS?

Don't forget we will pay £20 for an example of Turbo programming. The listing must be short enough to fit on one page and must use the features that are unique to Turbo Basic. You will have more success in getting your listing accepted if you choose an area of programming which has not already been covered. Send your contributions on disk to the Editorial address on page 3.

WHAT IS TURBO BASIC?

Turbo Basic is a powerful BASIC language for the Atari originally published in the German magazine Happy Computing who retain the copyright but have released the program to the public domain. It adds over 60 new commands to Atari Basic, runs three to five times as fast, yet is totally compatible with existing Atari Basic programs. It comes with a compiler that will compile any Atari Basic or Turbo Basic program to run at machine language speed.

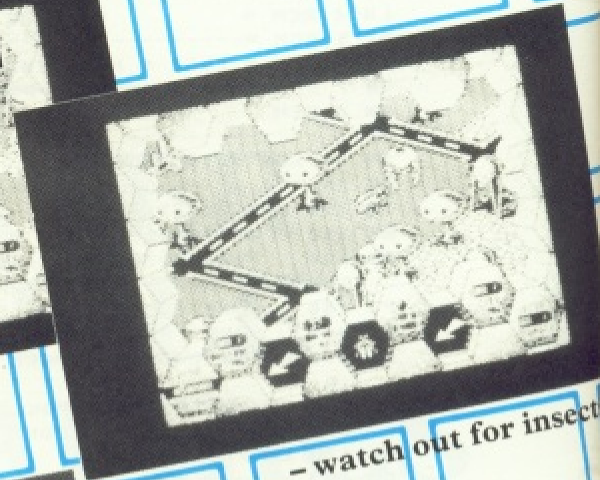
You should be able to get a copy from any source of Public Domain software such as your local user group or the PAGE 6 Accessory Shop.

THE SOFTWARE REVIEWS



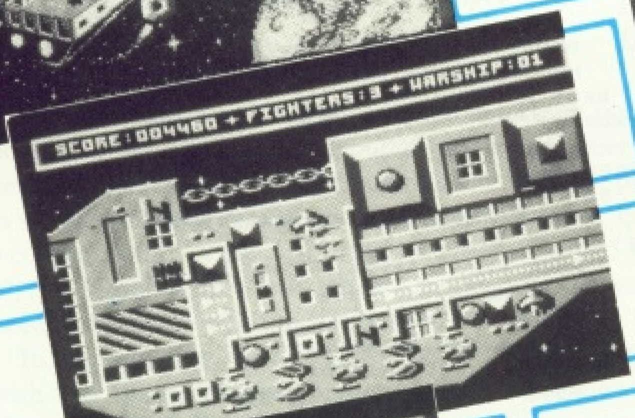
Talladega – not so good





Amaurote – watch out for insects

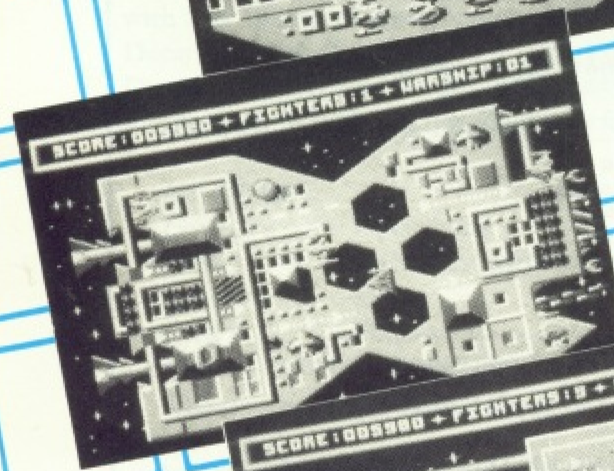


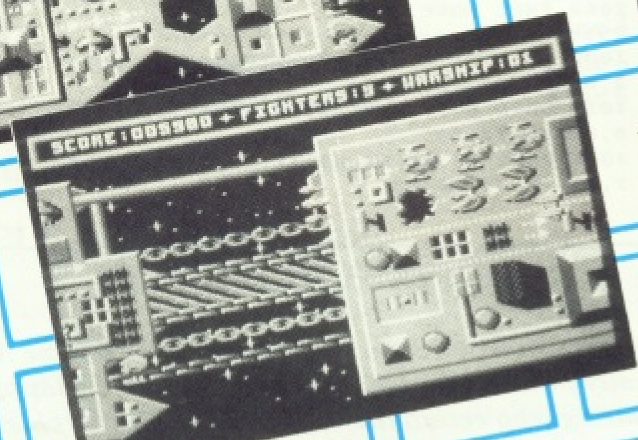




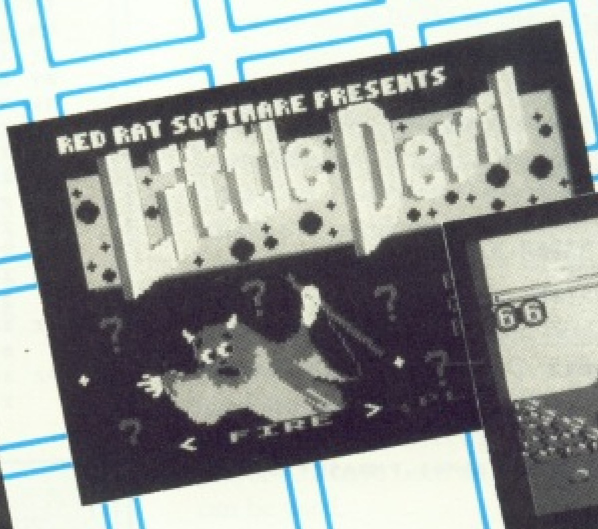


Nightmares from Red Rat



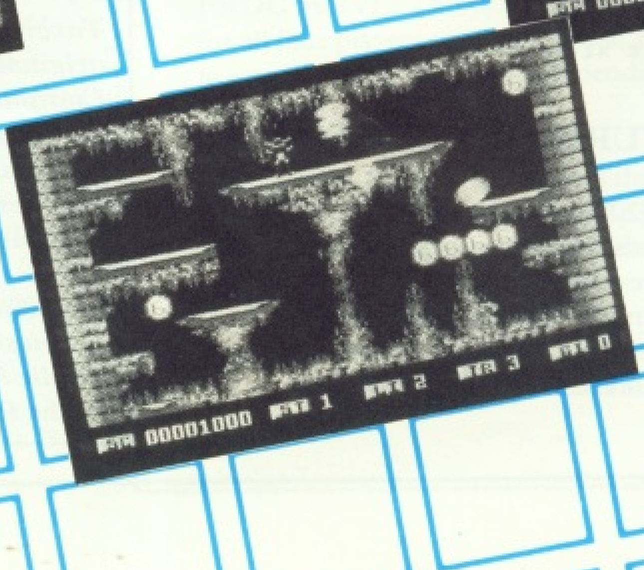


Shoot 'em up with Mirax Force





Devilish happenings



ENJOY YOUR NIGHTMARES

NIGHTMARES

Monstrosities abound in this latest release from Red Rat. Originally banned along with 'Little Devil', NIGHTMARES has reportedly since been withdrawn from the main offended party's list of 'untouchable' software – perhaps their conscience was keeping them awake at night?

It's a shoot 'em up by nature, but just for a change there aren't any space-age zap-mobiles, Photon missiles or Alien Motherships to worry about. This time you assume the role of a brave Faerie (not a typo!) and as you might have guessed, the fate of elf-kind lies entirely in your skilful hands. Someone has taken a lot of time and effort to write a fantastic plot, which doesn't add a great deal to the game but makes for some excellent reading while you're waiting for it to load in!

It seems that elfin society needs protecting from the encroaching darkness that threatens to engulf the land. How unfortunate that the Faerie King – Lord Motorhod – is away on business and unable to drive the evil essences back to hell and hence rekindle the magical radiance that keeps the Faeries perpetually young and happy!! Only you can save the day by collecting radiant insects called Airflits and destroying the frightening array of hideous Demons, Ectoplasm spitting 'Grunts', Ravening Werewolves and the ugly 'Monkoids'. No piece of cake! Although armed with a magic bow and arrow plus an intermittent supply of Lightning bombs, the monsters are continually in pursuit with only one intent – to sap your precious energy reserves! They invariably succeed too! If you manage to collect the specified quota of Airflits, rescue all of the stray faeries and eliminate a sufficient number of nasties, you must then search for an exit door taking you through to the next in the series of fifteen action-packed levels.

As for visual effects, you will be hard put to find a better variety of monsters than in NIGHTMARES, they really are a terrific bunch of nasties! You won't have to search the screen for a minuscule blob like in so many other arcade games – this lot are VERY conspicuous filling up as much as half of the available screen height! The attention to detail is superb, and each level features its own horizontally scrolling background scenery. Music and sound effects are very good too, providing the decisive touch to an outstanding overall impression. One word of warning: NIGHTMARES becomes very challenging, especially on the higher levels, so if you haven't got an auto-fire joystick I would suggest that you acquire one before hand!

Games of the shoot 'em up genre can be boring at the best of times if not constructed in a competent manner, but Red Rat have found the magic formula to produce an entertaining package of the highest quality. Be sure to show your appreciation!

Paul Rixon

Published by Red Rat. £7.95 on cassette – £9.95 on disk – 1 player with joystick

MAY THE FORCE BE WITH YOU

MIRAX FORCE

EDITOR'S CHOICE

Tynesoft describe MIRAX FORCE as 'The Ultimate Shoot 'em up', and whilst it is basically yet another addition to the long list of 'Uridium' style scrolling space-zap games, this one certainly looks like giving the competition a fair run for their money.

There's not anything very original about the plot, it's just another case of flying your space craft – 'Star Quest' – over the Alien Mothership, destroying as much of it as possible as you go. Eventually the Mothership's main reactor begins to pulsate, allowing you access to the following level of play. Not that easy, of course, since Alien defence ships forever block your path in an attempt to halt your mission, and fire missiles which can be very difficult to dodge. Avoiding these is not the only problem – indestructible pylons, buildings and shadowed objects protruding from the surface of the Mothership must also be negotiated. Once again, an auto-fire joystick is highly recommended!

An initial glimpse of the ace title page acts as a brief graphical taster of what is to follow. The display scrolls horizontally over several screens, smoothly and in the direction of your choice at fast or slow speed as desired. Some amazingly intricate designs form a birds-eye view of the Mothership, and colours are chosen at random each time you play. Occasionally these clash slightly but it's a small price to pay for an interesting effect created most of the time. All in all the game is a great display of the Atari's graphical capabilities. Congratulations Tynesoft, you've discovered them at last!

Sound effects are pretty standard, but an added bonus is digitised speech created with the assistance of 2-bit Systems' Replay package. This will hopefully kill the myth that quality electronic speech is sacred to the ST fraternity! An extremely clear voice announces 'The battle begins', 'Mirax Force' and 'Game over'. It possibly says other things as well, but unfortunately I didn't get far enough into the game to find out! MIRAX FORCE suffers from the same drawback as other space-zap games – it's not at all easy to progress very far without a great deal of practice. This does mean however, that the game would seem to offer lasting appeal, and at least the possibility of some extra speech should hopefully provide an added incentive to persevere!

My only gripe concerns the brief instructions printed inside the inlay – not only are they riddled with mis-spellings and incorrect grammar, the loading instructions are wrong too! Still, on the whole this is a first class effort from Tynesoft, who seem to have upped their previously standards considerably in recent months. It won't be everyones cup of tea, but if you're looking for a challenging and fast-paced scrolling space-zapper, you need look no further than MIRAX FORCE.

Paul Rixon

Published by Tynesoft. £7.95 on cassette – £9.95 on disk – 1 player with joystick

YOU LITTLE DEVIL!

LITTLE DEVIL

You may recall that LITTLE DEVIL was one of two Red Rat titles grabbing the headlines last issue following the absurd decision by a certain British distributor, along with others, not to stock it, supposedly to prevent gullible Atarians being harmed by its alleged occult content(?!?). If past events in the publishing field are anything to judge by, this should (hopefully) ensure Red Rat of a best-seller, as Joe Public spares no inconvenience to experience what he is supposed not to see. This won't be a particularly difficult task, as Red Rat can supply the game directly.

What's all the commotion about then? Well, sorry to disappoint you folks but LITTLE DEVIL is about as worthy of an 'X' rating as an episode of 'Rainbow'! Don't let this put you off though. The game is in fact an excellent implementation of the platform variety, the objective being to collect items from each screen so as to progress onto further levels where the adversaries have multiplied. These items just happen to be lost souls floating in a limbo existence in the bowels of Hades. It's up to you, as the Little Devil himself, to free the souls and thus advance onto further realms, taking you nearer and nearer to Castle Despair where King Mordread's imprisoned daughter – Princess Linarta – anxiously awaits her gallant rescuer!

There would appear to be only four different screens in the game, but this shortcoming is more than compensated for by the impressive design-work forming the backdrop to each one, and the fact that controlling the Little Devil's jumps around each screen in the time limit allowed (twenty-five seconds!) is certainly not a feat to be taken lightly! It starts off fairly easily but after level one, extra static obstacles are added increasing the challenge immensely. Running out of time or brushing with a guardian ghostie causes the Devil to forfeit a life (in Hades??), so to make your quest a little less impossible, a number of life-prolonging facilities are available. For instance, the time limit can be reset several times, and 'Arkanoid' style floating symbols can be captured to provide extra bonus points and stun the nasties for short periods. Additional resets and lives are automatically obtained upon completion of certain stages of the game.

I haven't mentioned the sound – this should be enough to tell you that it isn't exactly one of Red Rat's finest efforts in this respect, the music being a somewhat unconvincing rendition of Scott Joplin's 'Elite Syncopation' – but overall LITTLE DEVIL can definitely claim to be another fine and much welcome addition to the range, one that will keep platform enthusiasts coming back for more to try and improve their standings in the highscore table, thus assuring a super value for money purchase.

Paul Rixon

Published by Red Rat. £7.95 on cassette – £9.95 on disk – 1 player with joystick

DRIVING YOU CRAZY!

TALLADEGA

If you were to have read all of the instructions accompanying this latest offering in MIL's 'Top Ten' series, you'd be forgiven for thinking that it could possibly be the ultimate 3-D race game. In fact, it is a Cosmi title dating back to 1984 and I'm afraid it's probably the very worst race game currently available!

Graphically, TALLADEGA bears more than a passing resemblance to 'Pole Position', although on closer inspection it is inferior in design, colouring and animation. For example, the grass is grey(!), your car always remains static – even when cornering – and the general movement of vehicles can be somewhat unpredictable. Sound is fairly mediocre, consisting of roars, beeps and an uninspiring theme tune, but on the whole the effect is reasonably acceptable and if it were not for the comments to follow, I wouldn't hesitate to recommend the game.

You have a choice of racing on the 'Tri-Oval' or a random circuit, although the random one seems to be virtually identical every time (Bug #1). Then it's onto the qualifying lap, which you are supposedly aiming to complete in as little time as possible in order to gain a favourable position on the starting grid. However, if you do go as fast as possible the race will suddenly terminate at a certain stage with the erroneous message 'Lap time exceeds 149.9 seconds' (Bug #2). Going slowly is the only safe way to assure an interrupted completion! Regardless of what place you eventually manage to obtain on the grid, the race proper then commences with you in third slot, Richard Petty in second and someone called 'I.M.Fast' in Pole position (Bug #3). Richard Petty immediately overtakes I.M.Fast and stays in first or second place for the remainder of the race.

Opposing cars don't always appear from the horizon or behind – sometimes they simply materialize out of thin air, often just a short distance in front, causing an accident and again, termination of the race (Bug #4). The top speed is 250mph, although 290mph can be achieved with Turbo-boost, and other 'unavailable' speeds between these two have frequently been experienced! (Bug #5). It is also possible to slipstream so as to conserve fuel – one of TALLADEGA's more commendable features. Fuel levels and tyre wear are indicated above the main play area, so that you may judge when a pit stop is necessary. Here's a novelty – when you enter the pits, all of the other cars stop dead in their tracks and time stands still!! (Bug #6).

Also symbolized are various status flags, and the name of the driver immediately ahead of you. Since it's impossible to drop any further back than second position – even when stationary – this never displays anything other than Richard Petty or 'Player is in 1st place'! (Bug #7).

These are just a selection of the many problems plaguing TALLADEGA. Without doubt it's the most bug-ridden commercial game I've been unfortunate enough to experience for a long time.

Paul Rixon

Published by Maynard International Ltd. £1.99 on cassette – 1 player with joystick

A NOVEL WAY TO GET A BUZZ!

AMAUROTE

Amaurote is another game from the same Mastertronic label that brought Atari users 'The Last V8' and 'Spellbound', so my expectations were understandably high.

The cassette inlay rambles on about how you, as an officer in the Royal Army of Amaurote, have the task of clearing all 25 districts of the city. The city has become infested by killer insects, and the population has taken flight. The army, after a bloody struggle, was forced to withdraw, and so it is up to you, as the last remaining uninjured officer, to take on the creatures single-handed.

Once the program has eventually loaded, you are greeted by the credits, which are displayed on the viewscreen of your Arachnus 4 armoured car, accompanied by a stirring piece of music. The top 80% or so of the TV is taken up by the viewscreen, with the remainder taken up by the control panel with all your instruments. This is very detailed, and quite difficult to make out at first. It consists of numerical readouts detailing your cash left, % damage to district, No. of bombs remaining, % damage to the city as a whole, and damage to your craft. There are two additional instruments – The Scanner, which allows you to 'home in' on the different insects and bombs, and the Supabomb indicator, which flashes when you are carrying the Supabomb (funnily enough!).

You start the game proper by selecting which of the 25 districts of the city you wish to visit first. The objective is to clear each of these sectors of all the insects, so it makes little difference which sector you start with. There are different types of insect – Scouts fly around the city on the look out for food and intruders (i.e. you!), and then report your position back to the Queen. Drones are the most common and plentiful, and are sent out by the Queen to nab you. Once close to you, they are hard to shake off.

Your craft is armed initially with 30 bouncing bombs which are effective against these insects. Conventional bombs don't work against the Queen herself so you have to radio an order for a Supabomb. Pressing the Option key momentarily freezes the game and displays a menu of options. You have the choice of ordering a Supabomb, replenishing your stock of ordinary bombs, repairing the Arachnus 4 or being transported to a different position. All of these use up your cash. You start with £5 million which may seem like a lot, but I can assure you it is depleted very rapidly!

After selecting the sector, you are greeted by a 3-D view of the area, with your Arachnus 4 sitting in the middle. Your viewpoint is above, and at a 45 degree angle to, the action. The surroundings are detailed and have a very futuristic feel to them, with strange geometrical shapes abounding. Nudging your joystick moves your craft in the appropriate direction. Not only does it resemble a spider in looks, it also moves like one on its, albeit 4(!), pincer-type legs. In the background, atmospheric chamber music plays. The animation is quite impressive and the view reminiscent of the Knight Lore/Alien 8 games of old. The screen doesn't scroll, but flips when you near the edge.

Sooner or later, you are likely to come across one of the insects, probably a Drone. These pad towards you, and once spotted, you have a hell of a time trying to lose them, so you decide to let fly at them with one of your incredible bouncing bombs. You push the joystick towards the varmit and press the fire button, only to see the bomb soar out over the top of the insect and off the screen! You then have to wait until the bomb hits something (a building usually!) before you can fire again. By that time, the insect has probably caught up with you, and is rapidly draining your energy. This is one of the major gripes I have. It is incredibly difficult to hit the thing you are aiming for, as the bomb takes an age moving, by which time the target has moved miles from the spot you were aiming for!

After playing for a while you can develop a technique to track down Drones using the Scanner, but it is by no means easy, usually requiring firing from one screen, blind, onto another. After a time, you will no doubt be ready to take on the Queen herself. First you must order a Supabomb, which is dropped at a random location. (By the way, the incidental music which accompanies the radio screen and the zone select screen is excellent). After locating and collecting this, you are ready to find and destroy the Queen. Note that the Supabomb is primed and armed when picked up, which means that you cannot use the normal bouncing bombs en route, so beware. Arrows on the scanner lead you to the Queen, which you must hit with your bomb. This can be tricky, as by this time she is probably onto your plan and has arranged a 'welcoming party' of drones. It's a good idea to clear these before even picking up the Supabomb. Assuming you manage to destroy the Queen, wiping out the remaining insects in the sector is relatively easy, as they are no longer under her command and then, all that remains is to do the same in all the other 24 districts ... and you've already used 1 million – tut, tut!

Despite my criticisms, I enjoyed this game. The graphics are excellent, as is the animation, although it does slow down slightly with a few drones on screen. The presentation is superb, from the professional 'look' to the many extra touches, such as the Radio and the Zone selection screen, to the atmospheric music which accompanies the title & Radio screens etc.

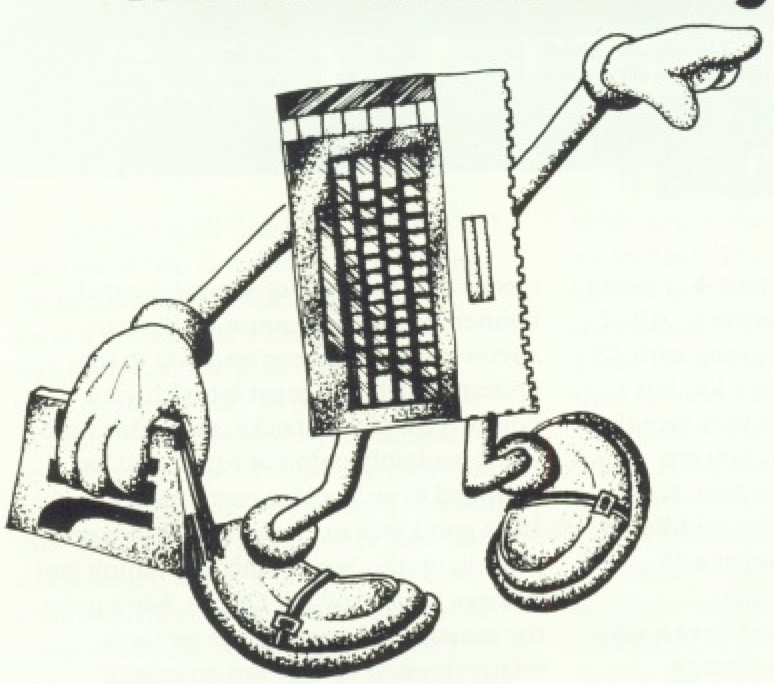
The music during the game is good, but a bit repetitive. I found the movement a bit sluggish and quirky, making manoeuvres difficult at the best of times. The firing, as I've mentioned, is another sore point. It's too difficult to hit what you want to hit, as you have to be on exactly the same line, and the right distance away when you fire. Having said that, with practice, it IS possible to fool the drones and escape them. The Repair and Rescue options are also very useful (and well used!). The game does play slowly, but then again, it is basically a strategy game with good graphics. It will take patience and a great deal of skill and time to complete, trying to keep city and district damage low, whilst keeping an eye on available funds!

Despite my reservations, I kept on coming back for more (a glutton for punishment), which indicates good playability, perhaps the most important factor. In summary, great graphics, good sound, excellent music and presentation. A very professional product on the whole and well worth the £2.99 price tag it carries. At this price, it's a steal, and I wholeheartedly recommend it. Keep up the good work, Mastertronic!

Gordon Cameron

Published by Mastertronic M.A.D. – £2.99 on cassette – 1 player with joystick

Mark Hutchinson's FIRST STEPS



NUMBERS

This issue I thought I might explain some mathematical manipulations that have been used in previous columns. It is all very simple so you will not need to book in at your local college for an 'O' level maths course!

If you did not already know, the computer contains a section of memory that you can either read or write to called random access memory (RAM) and memory that cannot be written to, called read only memory (ROM).

STORING NUMBERS IN MEMORY

RAM can be pictured as a series of little boxes, or pigeonholes, each containing a number from 0 to 255. Each number gives the computer a piece of information. As you may know from past articles, memory is made up of millions of little switches (bits) in blocks of eight (this is why your machine is termed 8-bit). Each switch has two conditions, either on or off. Mathematically, any combination of eight with two states means two to the power of eight – 256 (0 to 255).

Supposing we want to store numbers greater than 255? For this we must use two memory locations. One is termed the low byte and stores the numbers 0 to 255, equivalent to the units (0 to 9) in decimal. The second is the high byte and stores the multiples of 256's, equivalent to the tens in decimal. What if we want to store 255? This can be stored just in the low byte, as can any number from 0 to 255 but if we had 256 we would store it as 1 in the high byte and clear the low byte to zero.

As an example, I will pick a number at random – 57344. This needs to be split into multiples of 256 so first I find the high byte by dividing this number by 256. The result is 224. Any remainder will be less than 256 and will be stored in the low byte. To find the remainder I multiply 224 by 256 and subtract it from 57344. In this case the remainder is zero. If you want to include this in your own programs then it will be as follows,

```
10 NUMBER=57344
20 HIGHBYTE=NUMBER/256
30 LOWBYTE=NUMBER-256*HIGHBYTE
```

I should point out here that mathematical equations are worked out in a certain order irrespective of how they appear in a program line. In order of priority they are:

- Brackets
- of, e.g. a third of six
- division
- multiplication
- addition
- subtraction

In line 30, therefore, the HIGHBYTE is multiplied by 256 before it is subtracted from NUMBER.

WHY STORE NUMBERS?

Why do we need to use all this at all? Well, within the RAM are certain locations called POINTERS. A pointer is a signpost. It contains a number which will point to another location in memory. So what is the point of that I hear you pun! Well, let's have an example. Location 756 is just such a pointer. It holds a number that, when multiplied by 256 will send the computer to a location where all the characters are stored. By sheer coincidence, this number just happens to be 224. Now, suppose we stored another character set at 57856. By changing the number stored in location 756 we can send the computer to 57856 for a different character set. This number is, of course, 57856/256 (226 exactly).

Now for your homework and a bit of magic. Set up your computer in a GRAPHICS 1 screen and print something on it using PRINT #6; "TEXT" (or ?#6; "TEXT" for short). As usual, you will see that the characters are in upper case, so clear the screen. Print POKE 756,226 and press RETURN. Now try printing to the screen and see what happens.

OTHER EXAMPLES

Another often used example is to lower the top of RAM to protect memory. Location 106 holds a number which relates to the amount of RAM available. This number must be multiplied by 256. Each unit is called a 'PAGE' of memory and four pages = 1K of RAM (4 times 256 = 1024 = 1K).

Let us pretend that we wish to protect 4K of memory (the protected size must be in multiples of 256). First we must find out how many pages are available by PEEKing location 106, then subtract 16 (the number of 256's in 4K) from this total and POKEing the new number into the location, i.e.

```
10 PAGE=PEEK(106)
20 NEWPAGE=PAGE-16
30 POKE 106,NEWPAGE
```

An easier way to do this is by

```
10 POKE 106, PEEK(106)-16
```

Make sure that you reset the RAM top before a graphics call. this will ensure that the new details for the display list are properly stored.

USING OFFSETS

In a previous article, I explained about the IOCB and gave some details about offsets. Rather than POKE to several different locations, having to remember each one, why not take one as a base and POKE to the base plus an offset. For example, we know that the character set starts at 57344. To change the full character set by POKEing each individual location would take 1024 lines of POKE LOCATION, DATA. The easiest way would be to take 57344 as a base and add one each time then POKE in the DATA. This is called incrementing. To do this properly, the offset or increment would have to start off at zero, not 1, otherwise the first POKE would be at 57345. We could change the base to 57343 and start the offset at 1, but when you looked up this location much later it would not make immediate sense (it is a floating point logarithm routine!).

Unfortunately, the character set is in ROM and we cannot change it. We can store a new character set in RAM though. It only needs the pointer to be changed to indicate this new location and your characters automatically change. Listing 1 is a small routine to do just that.

Some points to note. I used a location suitable for this demo. I used a flag of -1 to make sure the program finished without an error. This is not strictly necessary but it does save the annoyance of inputting too much data. Also, lines 100 and 110 could be combined as line 100 (the computer automatically keeps track of the data to be read), but I did this for clarity. Notice how the space character has been changed. Even if you cannot see the characters, type POKE 756,224 and press RETURN to get the old set back. Try new DATA and run it again.

That is all for this time. Since I have given you some hints on graphics modes and how to store them, why not read the next thrilling installment and find out how to draw some pictures?

Don't forget that you can write with any problems. Include a s.a.e. if you want a reply. **Write to Mark Hutchinson, 1 Hollymount, Erinvale, Finaghy, Belfast, BT10 0GL**

Listing 1

```
RC 9 REM *** Set BASE at a new position.
LA 10 BASE=10240
LQ 19 REM *** Start a reading loop.
JO 20 FOR OFFSET=0 TO 8
CF 29 REM *** Make sure the loop ends pro
   perly.
BP 30 READ DATA:IF DATA=-1 THEN 60
RY 39 REM *** Place data in new location.
GL 40 POKE BASE+OFFSET,DATA
UR 49 REM *** Continue the loop.
DK 50 NEXT OFFSET
CB 59 REM *** Tell the computer where to
   find the new set.
TI 60 POKE 756,10240/256
KC 69 REM *** Finish the program.
YV 70 END
GI 99 REM *** DATA
RB 100 DATA 0,127,60,24,0,24,60,127
TS 109 REM *** Finish off program.
FY 110 DATA -1
```

UPDATE

MJDBASE (ISSUE 30): Reader Peter Boulter tells us he has discovered a small bug when the drive is set to 0 or 2 and option 7 is chosen from the menu. The program goes into an endless loop between lines 18850 and 18870. The fix was to replace GOTO 18850 in line 18870 with GOTO 19450.

REVISION C FOR CASSETTE (ISSUE 31): Unfortunately line 1160 was missing from the listing which can only be accounted for by Phil's typing abilities! The missing line is:

QQ 1160 DATA 1,211,9,2,141,1,211,96,0,0,733

BOWLTRAP (ISSUE 31): The program will not run on 400/800 models as listing due to a bug in the OS on these computers. The last time this obscure bug caught up with us was in 'DRAUGHTS' in issue 16. 400/800 owners must change line 60 to:

KQ 60 POKE 106,PEEK(106)-10: CS=PEEK(106)+2: CSBASE=CS*256: GOSUB 1300

FONT FACTORY (ISSUE 31): Cassette users must make the following changes to be able to load and save properly. Delete lines 2930, 2940, 2950, 2960, 2970, 2980 and amend line 4610 as follows:

KD 4610 IF FX$(1,2)="C:" THEN DV$="C:": POKE 752,0: FL$=FX$: FF$=FX$: RETURN

MORE PROGRAMS WANTED

Don't be shy! Some of you have written some very good programs which are just sitting at home doing nothing. Dig them out and send them in to PAGE 6 for possible fame and fortune!

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Please send programs on disk (or cassette if you don't have a disk drive) together with supporting documentation (also on disk or cassette if possible). Feel free to give us a ring first if you are not sure but dig out those programs or write them from scratch. It could be well worth it. Write to:

PHIL CARDWELL
PAGE 6, P.O. BOX 54,
STAFFORD
ST16 1DR

THE
RESOURCE FILE

The Resource File is a service provided by PAGE 6 to help Atari owners (both 8-bit and ST) find sources of information, help and supply. An entry in this feature does not necessarily imply any endorsement by PAGE 6 and readers are advised to check for themselves to ensure that the information is still current. We would ask any readers who find information to be inaccurate or out of date to let us know so that an entry may be amended or deleted.

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USER GROUPS

ABC
Contact Mike Donoghue, 135, St. Leonards Road, Leicester, LE2 3BZ. Tel. 0533 700190. Retailer and both 8-bit and ST user groups.

ATARI USER GROUP (IRELAND)
Contact 100, Silloge Avenue, Ballymum, Dublin 11, Ireland. Tel. Dublin 425918

BESTWOOD 8-BIT USER GROUP
Contact David Taylor, 60 Stevenholme Crescent, Bestwood Park, Nottingham, NG5 5JW. Tel. 0602 209735. 8-bit local users only.

BOURNEMOUTH AND POOLE ATARI USER GROUP
Contact Colin Hunt. 248, Wimborne Road, Oakdale, Poole, Dorset. ST, 8-bit, hardware and software development.

BURY ST. EDMUNDS USER GROUP
Contact Gary Brummage, 22, Ridley Road, Bury St. Edmunds, Suffolk, IP33 3HS. Please send S.A.E. for details.

CROMWELL ATARI USER GROUP
Contact Dave Leggett, 3, Chestnut Close, Brampton, Huntingdon, Cambs. Tel. 0480 50553. All users welcome.

FLOPPYSHOP ST
Contact Steve Delaney, 50, Stewart Crescent, Northfield, Aberdeen, AB2 5SR. Tel. 0224 691824.

The GATEWAY CLUB
Contact Phil Herberer, 164d Radcliffe Road, Lakenheath, Suffolk. Tel. (Eriswell) 2363. All computer club with Atari section. Meets once a month.

LACE (LONDON ATARI COMPUTER ENTHUSIASTS
Contact Glenn Leader, 143 Richmond Road, Leytonstone, London E11 4BT. Tel. 01 556 0395. XL/XE/ST users. Great newsletter and PD library.

L.A.C.E.
Contact Bob Chewter or D. Clapson, 33, Garden Close, Chinbrook Road, London, SE12 9TG

MACCLESFIELD COMPUTER CLUB
Contact Peter Solomon. Tel. 0625 20782 evenings and weekends. All computer club with Atari section. Meets fortnightly.

MERSEYSIDE ATARI CLUB
Contact Mike Lynch, 24, Oakdene Road, Anfield, Liverpool, Merseyside, L4 2SR. Tel 051 264 8435. ST ONLY. Regular meetings, newsletter and more.

RAGE HARD A.U.G. (8-bit)
Contact Tony Longworth, 13, Greenfield Road, Little Sutton, South Wirral, Cheshire, L66 1PE. Tel. 051 339 0405. For 8-bit users everywhere. Send s.a.e. for details.

ST CLUB
Contact Paul Glover, P.O. Box 20, Hertford, S13 8NN. Mail only(?). Worldwide.

VTB ATARI COMPUTERCLUB
Contact Christian Delabarre, Hekstraat 7, 9050 Evergem, Belgium. Tel. 091/26.29.29. For XL, XE, ST. Organised talks/visits etc.

WORLD ATARI PENPALS Int. User Group (WAP)
Contact Max Terveen, Magerhorst 8, Alphen a/d Rijn, 2402 LP, The Netherlands. Tel. 01720 45583. Members in USA, Canada, France, U.K., Greece, Germany, Saudi Arabia. Have circulating disk (8-bit and ST). Mail only.

Do you want others to know about your group? Send details as above ONLY (5 words max. on Members!) on a plain sheet of paper headed RESOURCE FILE – USER GROUPS.

That's all you get! We will not publish any other details as meeting times and places tend to change. Appoint someone responsible to handle any enquiries received.

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Name: **THE VILLAGE**
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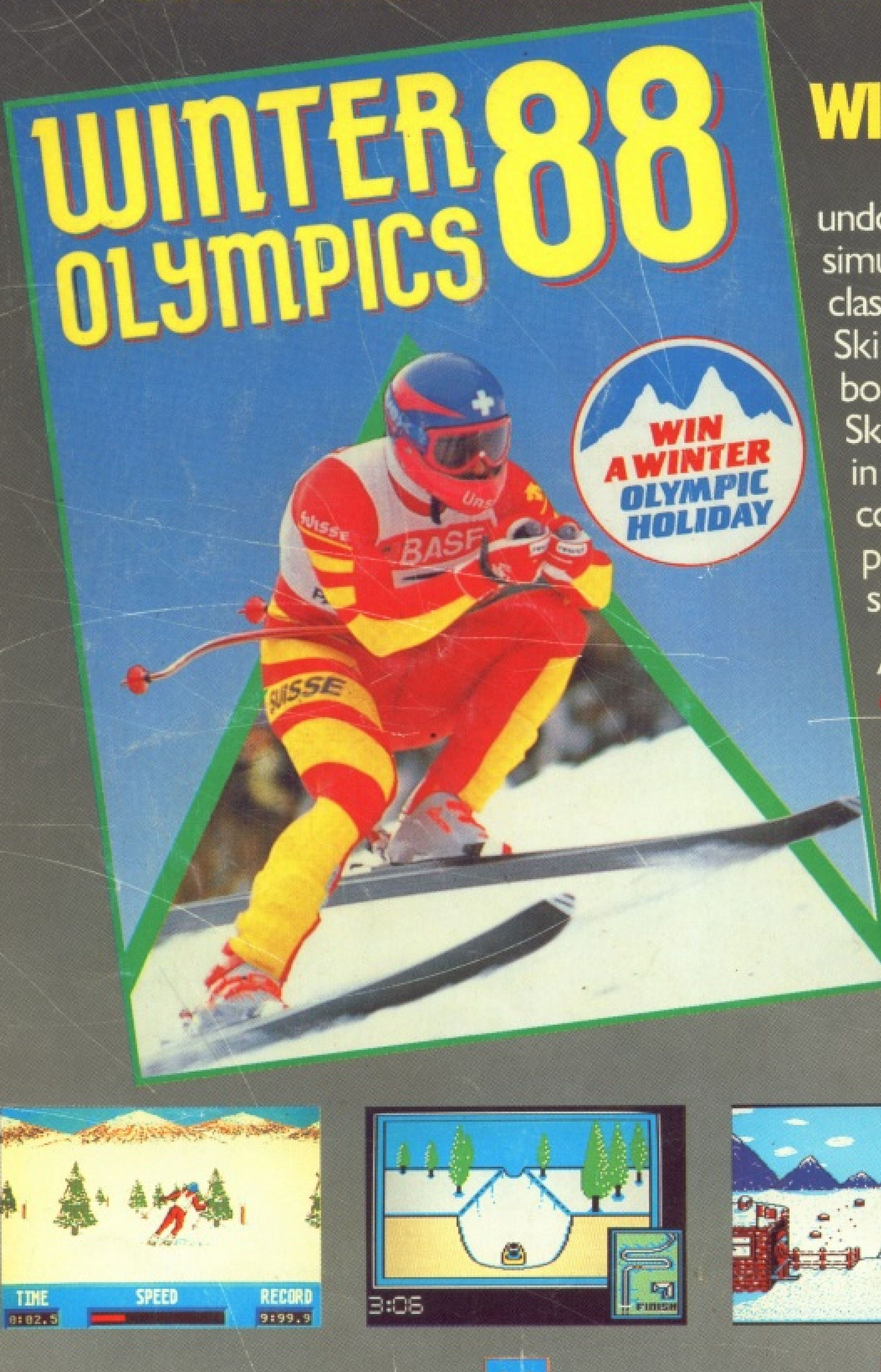
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Do you run a Bulletin Board which caters mainly for Atari 8-bit or ST? For an entry in this feature please send us details as above (5 words max on Features!) on a plain sheet of paper headed RESOURCE FILE – BBS.

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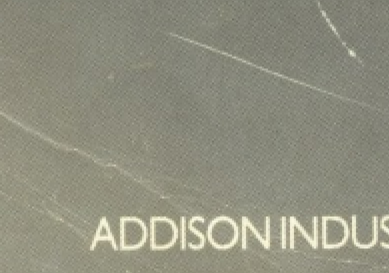


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